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Committee on the Peaceful Uses of Outer Space

Report on the United Nations/European Space Agency Symposium on Economic Benefits of Using Space Technology Applications in Developing Countries, Co-sponsored by the European Space Agency, the European Commission and the Government of Austria (Graz, Austria, 7-10 September 1998)

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I. Introduction

A. Background and objectives

1. The General Assembly, in its resolution 37/90 of 10 December 1982, decided that, in accordance with the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82),[1] the United Nations Programme on Space Applications should, *inter alia*, promote greater cooperation in space science and technology between developed and developing countries, as well as between developing countries.

2. The Committee on the Peaceful Uses of Outer Space at its fortieth session, held in June 1997, endorsed the programme of workshops, training courses and seminars proposed for 1998, as outlined by the Expert on Space Applications.[2] Subsequently, the General Assembly, in its resolution 52/56 of 10 December 1997, endorsed the United Nations Programme on Space Applications for 1998.

3. In response to General Assembly resolution 52/56 and in accordance with the UNISPACE 82 recommendations, the Symposium on Economic Benefits of Using Space Technology Applications in Developing Countries was jointly organized by the United Nations and the Government of Austria at Graz, Austria, from 7 to 10 September 1998. The Symposium was co-sponsored by the Federal Ministry for Foreign Affairs of Austria, the province of Styria, the city of Graz, the European Space Agency (ESA) and the European Commission. The Federal Ministry also acted as host of the Symposium, which was the sixth in a series of meetings and also served as a follow-up to the United Nations/European Space Agency Symposium on Space Industry Cooperation with the Developing World, held at Graz from 8 to 11 September 1997.

4. The main objective of the Symposium was to provide a forum for international and national space experts, policy and decision makers and representatives from space-related industry to discuss the role of space technology in securing the economic growth of developing countries. A major aim of the Symposium was to suggest possible solutions to the constraints that kept developing countries from taking full advantage of space technology applications. Participants emphasized the importance of addressing the cost-benefit aspect of using space technology and the implementation of efficient space policy plans adapted to the needs of developing countries. Such information could help to convince policy makers and other decision makers in developing countries of the value of allocating resources to implement space technology applications in support of national and regional development.

5. The present report was prepared for the forty-second session of the Committee on the Peaceful Uses of Outer Space and the thirty-sixth session of its Scientific and Technical Subcommittee. The proceedings of the Symposium, including a list of participants, will be made available in due time.

B. Programme

6. At the opening of the Symposium welcoming statements were made by representatives from the United Nations, ESA and the host country. The programme of the Symposium was divided into a series of sessions, each addressing a specific issue. Presentations by invited speakers were followed by panel discussions and brief presentations by participants from developing countries on the theme of the Symposium, describing the status of space technology applications in their respective countries. There were a total of 24 papers presented by invited speakers and 23 presentations by participants from developing countries.

7. The sessions focused on opportunities for and examples of establishing space technology applications in developing countries, the economic benefits of satellite communications and Earth observation applications, specific remote sensing application projects, training and education opportunities in space technology and space sciences and emerging space applications. In addition to the traditional space applications in the satellite telecommunications and satellite remote sensing sector, participants discussed the utilization of the international space station for benefits on Earth, the role of microgravity experiments to address health-care issues in developing countries, the use of recoverable spacecraft for agricultural plant growth experiments in China and spin-off benefits of space technologies, for example robotics originally designed for the exploration of the planet Mars, which could be used for control and monitoring tasks in decommissioned nuclear power plants.

C. Participants

8. Developing countries were invited to nominate candidates for participation in the Symposium. Participants from those countries held positions in institutions or private industry dealing with resource management, protection of the environment, communications, remote sensing systems, industrial and technological development and other fields related to the themes of the Symposium. The participants were also selected on the basis of their work experience with programmes, projects and enterprises in which space technology was already being used or was intended to be used.

9. Policy makers and others at decision-making levels from national and international entities were also invited. They were asked to highlight in their presentations the key issues relating to placing a higher priority on the operational implementation of space applications.

10. Funds allocated by the Government of Austria, ESA and the European Commission were used to cover the travel and daily expenses of participants from developing countries. In total, approximately 100 space experts attended the Symposium.

11. The following Member States were represented at the Symposium: Algeria, Austria, Azerbaijan, Benin, Brazil, Bolivia, Chile, China, Colombia, Egypt, El Salvador, Ethiopia, France, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Kazakhstan, Kenya, Lao People's Democratic Republic, Malaysia, Mongolia, Morocco, Nepal, Nigeria, Pakistan, Philippines, Republic of Korea, Romania, Sri Lanka, Sudan, Syrian Arab Republic, Thailand, Trinidad and Tobago, United Arab Emirates, United Republic of Tanzania, United States of America, Uzbekistan, Viet Nam and Zambia. The following international organizations and national entities were represented: Office for Outer Space Affairs of the Secretariat, European Commission, ESA, International Space University (ISU); Austrian Space Agency (ASA), Brazilian Space Agency (AEB), Centre national d'études spatiales (CNES), Centre royal de télédetection spatiale (CRTS), China Aerospace Corporation (CASC), Chinese Academy of Space Technology (CAST), German Aerospace Research Establishment (DLR), Indian Space Research Organization (ISRO), Korean Aerospace Research Institute (KARI), National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory (JPL), Space and Upper Atmosphere Research Commission (SUPARCO) of Pakistan. The space industry was represented by participants from EUROCONSULT (France), Iridium Germany (Germany), Matra Marconi Space (France/United Kingdom of Great Britain and Northern Ireland), SpaceImaging EOSAT (United States), Thuraya Satellite Telecommunications Company (United Arab Emirates), and WorldSpace Inc. (United States).

II. Observations and conclusions

12. A review of the observations and conclusions made at previous Symposia showed that certain consistent issues had been raised at each meeting. While space experts in a few countries had been quite successful in gaining the political support of decision makers in implementing pre-operational and operational space technology application programmes, space experts in other countries had been less successful and had achieved little progress over the years. The main problems mentioned involved gaining access to the people in charge and finding persuasive arguments to promote the benefits resulting from the use of space technology applications. Especially in view of the many other problems faced in developing countries, it was often difficult to promote investments in space technology applications, although the economic and social benefits often far outweighed the initial investments.

13. Space application projects had resulted in both short- and long-term direct and indirect benefits. Many success stories, if made public, could serve as constructive examples for developing countries. A cost-benefit evaluation of those applications should be conducted and should be made available to relevant institutions and decision makers. Standard procedures and space application possibilities should be defined and the practical experience with the relevant systems published so that the lessons learned would also benefit other users.

14. The issue of training and education of space technology experts was also often cited as a major concern in developing countries. The trained experts often did not find benign conditions for applying their knowledge or continuing their projects once they returned to their home institutions. Institutions sending staff for training should therefore consider beforehand the post-training role and responsibilities of staff.

15. The cost of data was another major concern for developing countries. In the near future, private companies would become increasingly important as dominant players in the remote sensing data market; those companies would

have to find ways to sell their data to countries with limited funding resources for obtaining such data. It would be incumbent upon those companies to win over potential customers by clearly pointing out the economic benefits of using satellite remote sensing data.

16. Developing countries should have a central office for coordinating space activities to ensure that they benefited optimally from using space technology applications. Such an office would have to be staffed not only by administrative staff but also by space technology experts knowledgeable in the benefits of space technology applications. Ideally, the office would directly report to the key decision makers in the Government.

17. With regards to satellite telecommunications, access to regional and global satellite networks was no longer a problem for developing countries. It would now be up to each country to provide the regulatory framework for using such systems, for example, by de-monopolizing their telecommunications sectors. Such a step would enable developing countries to leapfrog into the information age.

18. Satellite service providers should continue to build awareness of the value of satellite technology and its economic and social benefits for development through studies, publications and forums. They should also establish priorities related to economic and social growth in cooperation with developing countries that use telecommunications and satellite remote sensing data. They should encourage the involvement of decision makers in order to win support for the introduction of reforms, update of policies and regulatory options.

III. Presentations and discussions during the Symposium

19. The overall theme of the Symposium was first addressed by two keynote speakers, representing the views of both the space industry of industrialized countries and of developing countries and emerging space nations.

20. Prime examples demonstrating the economic benefits of space technology were the use of satellite technology for telecommunications and Earth observation applications. Satellite technology had been an important factor in the establishment of a global information society. It was a relatively new technology that had quickly developed into a sizeable and dynamic industry and was expected to continue to grow in the foreseeable future. Satellites or, more generally, the space segment were merely the starting point in a long, value-added chain. While it might be unrealistic for many developing countries to purchase or deploy their own space segment, there were many opportunities for them as users of space technology applications to gain social and economic benefits. The rapid development and large coverage of satellites compared favourably to other alternative technologies and yielded economic advantages, especially when combined with deregulation in the telecommunications and broadcasting sector.

21. By using space technology, developing countries could skip certain phases in their development and thus quickly obtain social and economic benefits. How space technology could provide a cost-effective alternative for a country's development was demonstrated by the keynote speaker representing the Chinese Academy of Space Technology. China, with its huge population, shortage in natural resources and frequent natural disasters had recently made great strides in developing the technologies for launchers, satellite telecommunications, Earth observation and recoverable satellites to meet its needs. CASC was currently conducting a project on space technology benefits consisting of three programmes: Space Seed Breeding Satellite Programme (SSBS), Disaster Monitoring and Prevention Satellite Programme (DMPS) and a technology transfer programme to upgrade traditional industries with space technology.

A. Establishing space technology applications in developing countries

22. Within the framework of the United Nations Programme on Space Applications, the Office for Outer Space Affairs assisted developing countries with establishing and implementing space technology applications. In order to gain an understanding of the role of the United Nations/ESA symposia in contributing to the growing use of space technology applications in developing countries, participants of previous symposia were regularly contacted by the Office for Outer Space Affairs and requested to provide information on their current activities and feedback on how they had benefited from their participation. A survey conducted in 1998 resulted in responses from former participants from Bolivia, Brazil, Egypt, Indonesia, Nicaragua, Uzbekistan and Zambia, who reported on the status of various follow-up projects.

B. Economic benefits of satellite communications

23. The telecommunications market had become a driving economic force in the information age and the strong link between a solid telecommunications infrastructure and a country's economic welfare had been recognized. The telecommunications sector was currently growing at twice the rate of the global economy. Satellite systems had made significant contributions to making the global information highway a reality. The worldwide telecommunications network had resulted in the creation of an information society and had brought about major changes in the economic, social and political areas. However, the majority of the world's people still lacked access to a basic telecommunications infrastructure.

24. Developing countries could enter the information age and become part of the global village by using carefully selected space technology to immediately acquire the capabilities required for setting up a basic telecommunications infrastructure. Candidates for the development of a national information infrastructure were the use of very small aperture terminals (VSATs), high-power satellite systems using digital compression technologies to better utilize the bandwidth of the frequency spectrum for applications such as digital audio broadcast (DAB) and direct broadcasting, and satellite constellation systems for establishing a global mobile personal communication system (GMPCS). It was evident that for developing countries the economic loss of not being part of the global information highway and not utilizing the emerging space technologies would be very significant.

25. The IRIDIUM system, a constellation of more than 66 satellites deployed in low-Earth orbit (LEO), currently provided worldwide mobile telecommunications services. IRIDIUM constituted a historical breakthrough in telecommunications: the global telecommunications network could be readily accessed from any location on the planet. There was no longer a need to first establish a terrestrial telecommunications infrastructure. The IRIDIUM system was owned by an international mobile communication consortium with equity partners all over the world. The cost of using the system was relatively high, but prices were expected to decrease in the foreseeable future. Several other companies were currently deploying or developing similar satellite constellation systems.

26. The Thuraya satellite system to be established by the Thuraya Satellite Telecommunications Company based in the United Arab Emirates was a regional mobile communications system based on the use of a high-power geostationary satellite bus with huge deployable antennae to provide hand-held services. Once operational, it would serve nearly 100 countries in Asia, Africa and Europe, using a geo-synchronous satellite and hand-held, dual-mode (satellite and global system for mobile communication (GSM)) terminals. Similar satellite systems were planned to serve other regions of the world and would be able to provide comparatively low-cost services tailored to the unmet telecommunications needs of the developing world.

C. Economic benefits of Earth observation applications

27. Agriculture was a large potential market for satellite data. Satellite remote sensing could be used for crop monitoring and forecasting and estimating yields. In larger countries satellite remote sensing was the only economically feasible approach in obtaining a reliable picture of the country's crop production. Even in smaller countries, satellite remote sensing produced better data and allowed the collection of information much faster and cheaper than traditional methods. The main hurdle of remote sensing applications was that it was not easy to account for the cost of services; while tariffs existed for services in satellite telecommunications (length of transponder time used), a transparent costing structure did not yet exist for remote sensing. The economic and social benefits resulting from Earth observation applications benefited society as a whole, and it was thus necessary to provide central budget assistance.

28. Another major application would be the contribution of space-based systems for disaster prevention and mitigation. Accurate and up-to-date information before, during and after disaster events could be used to keep the loss of life and damage to property to a minimum and reduce the reaction time needed to respond to and recovery from disasters. Disaster monitoring applications were still at a pre-operational stage, mostly limited by the spatial and temporal resolution of current systems. Several new remote sensing satellite systems, including some Earth observation satellite constellations, were expected to be deployed within the next few years and should help to transform the applications into fully operational projects.

29. India was hailed as one of the most advanced countries in using remote sensing data to support sustainable

development. The country operated an indigenous, sophisticated space and ground segment, a value-added chain of government remote-sensing centres and a nation-wide infrastructure to ensure that the acquired information was integrated into the decision-making process. It's biggest success story was the active involvement of user agencies, down to the level of individual farmers.

30. The European Commission's budget for space activities within the Fourth Framework Programme (1995-1998) was 350 million European Currency Units (ECU), with most of that money earmarked for Earth observation projects. With the May 1998 launch of the SPOT 4 satellite, the first European Commission sponsored remote-sensing payload, "Vegetation", was providing daily, global information on vegetation cover from space. It's main mission was to study the continental biosphere in the context of the Kyoto Protocol. The European Commission was also involved in telecommunications and space navigation projects. Some Earth observation projects were also being conducted in cooperation with developing countries.

D. Remote sensing applications: examples

31. The traditional methods for surveying and resource mapping had been rendered obsolete through the possibilities offered by the application of space science technologies. Methods such as triangulation, trilateration and traversing had become out of date through the use of the Global Positioning System (GPS), which allowed precise positions to be determined within accuracies in the millimetre range. Currently, simple GPS receivers could be readily purchased for less than $100. GPS equipment was in wide use in developing countries, however, the capabilities of indigenous companies to service such equipment needed to be improved.

32. The management of water resources had become a major issue in many regions. Countries that mostly depended on agriculture, such as Pakistan, needed to sustain their irrigated lands to ensure the population's basic supply of food. Owing to improper management, a large amount of water was wasted and had created an alarming situation in many regions. To improve the management of water resources, it was necessary to obtain reliable and regular information on the dynamic hydrological cycle and to understand the associated processes. Remote sensing data in combination with Geographic Information Systems (GIS) offered a cost-effective solution. Although most of the work in the field was still at the research level, some operational use was being made using LANDSAT and SPOT data.

33. The increased spatial and temporal resolutions of satellite imagery and plans for deploying Earth observation satellite constellations would alleviate some of the problems faced in operationalizing remote sensing applications. The IKONOS series of satellites were expected to be deployed by the Space Imaging company by the middle of 1999 and would provide black and white images with one-metre resolution and multispectral images with four-metre resolution with a revisiting time of between one and two days. The resolution was comparable to aerial photography taken from an altitude of 3,000 metres and accurate enough to replace 1:2400 scale maps. Applications were being developed for agriculture, mapping and environmental monitoring.

34. The Committee on Earth Observation Satellites (CEOS), a creation of the G8 summit of industrialized nations, was the coordinating body for worldwide Earth observation activities. The CEOS Information Locator System (CILS) was specifically developed with the needs of developing countries in mind. CILS, which had been online since May 1997, was still in its demonstration phase. CILS servers were located in Germany (http://cils.dlr.de), at the Joint Research Centre of the European Commission in Italy (http://cils.ceo.org), at the United Nations Environment Programme (UNEP) in Nairobi, Kenya (http://cils.unep.org), at the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Canberra, Australia (http://cils.ceo.csiro.au), and at the National Space Development Agency of Japan (NASDA) in Tokyo, Japan (http://cils.eoc.nasda.go.jp).

35. The session concluded with a panel discussion on promoting Earth observations applications in developing countries: cost-benefit considerations. Panellists discussed the benefits and obstacles of using information acquired from Earth observation applications, recognizing that remote sensing was a powerful tool in providing important information in a decision-making chain. The applications and benefits of space technology should be taught at all levels, ranging from formal education for school children to courses for decision makers. With respect to donor projects, the use of international experts should be minimized when possible, using local experts when appropriate.

E. Training and education in space technology applications

36. Developing countries had no option but to increase food production and to achieve socio-economic development to ensure a standard of living and ultimately the survival of their growing populations. Development had to be sustainable over time and could only be achieved through the use of modern technologies such as space technology, biotechnology and information technology. In developing countries, the education and training of space experts and space applications users was a major concern. A number of national, regional and international organizations were already offering a broad range of training programmes tailored to the needs of various user groups. The United Nations, under its Programme on Space Applications, was in the process of establishing several centres for space science and technology education that would provide training on a regional basis to a core group of space experts who, upon returning to their home countries, would form the basis for a well-trained team of local experts.

37. The International Space University (ISU) had been offering an interdisciplinary space studies course in the form of an annual 10-week summer session programme since 1987. Summer sessions were scheduled to be held at Suranaree University in Thailand in 1999 and in Chile in 2000. Over the last few years there had been an increase in the number of participants from emerging space nations and from developing countries. In 1996, ISU began offering an 11-month Masters of Space Studies graduate-degree programme. The topics covered the whole range of space activities, including space law, space sciences, space engineering, space life sciences, space informatics, space applications and space and society.

38. Specialized education for users of satellite remote sensing information was being offered by the International Institute for Aerospace Survey and Earth Sciences (ITC). The Institute's main objective was to assist developing countries in developing human resources to carry out aerospace surveys, use remote sensing applications, establish geoinformation systems and manage geoinformation. One field of specialization was the application of GIS and remote sensing for natural hazard mapping. Projects were being conducted on flooding in Bangladesh, on spontaneous coal combustion in China, on earthquakes in Colombia, on landslides in Colombia and Nepal and on volcanic eruptions in the Philippines.

F. Emerging space applications and the way forward

39. Space technology applications in developing countries were mostly restricted to applications in the telecommunications and Earth observation sector. The immediate benefits of those applications were obvious: establishing or improving the telecommunications infrastructure; providing up-to-date weather reports, disaster warning and mitigation measures; monitoring resources and supporting decision-making and sustainable development. However, there were a number of other, less well-known, space technology applications that could be of interest to developing countries in the near future.

40. In China, where 7 per cent of the world's arable land was used to support 22 per cent of the world's population, agriculture was the economic and social development base. The Aerospace Breeding Research Centre of CASC had flown and recovered various seeds on its recoverable spacecraft. The seedlings were exposed to the space environment for 5-15 days in an elliptic near-Earth orbit of 200-400 km, microgravity of 10^{-5} g, vacuum 10^{-5} Pa and temperature of 15-40 degrees Celsius. Genetic mutations were induced that were selectively developed after retrieval through breeding on the ground. After several generations, new strains were obtained and tested in large-scale plantation experiments. Over 100 variants of more than 50 kinds of crops had been flown in the past. The experiments resulted in the breeding of new strains with a 5 to 20 per cent increase in the yield compared to the original plants. In some instances crop quality was improved; for example, the protein content of some strains of rice increased by 9 to 12 per cent. For some strains of rice the growth period was shortened by 10 days. Low-height and disease-resistant rice seedlings as well as disease-resistant tomato and melon plants were developed. The results obtained through induced mutations in the space environment could not be reproduced by artificial irradiation or other methods on the ground. The development of space-bred seedlings with improved plant properties would directly benefit the country's large population and economy, and China planned to continue its research of aerospace breeding.

41. With the recent launch of the first components of the international space station (ISS), a new area in international space cooperation had begun to take shape. Partners in ISS, the world's largest space programme, were Belgium, Brazil, Canada, Denmark, France, Germany,

Italy, Japan, the Netherlands, Norway, the Russian Federation, Spain, Sweden, Switzerland, the United Kingdom and the United States and in the future possibly also the Ukraine. Following an ambitious schedule, the station would be built between 1998 and 2004. Although its short-term objective was to provide a laboratory for scientific and applied research, the station would ultimately help to develop procedures and technologies for space exploration beyond low Earth orbit. In the near term future, the highest priority will be given to scientific uses of ISS, including experiments in telecommunications, Earth observation applications, microgravity research (technology development, life sciences etc.) and basic space sciences.

42. Emerging space nations and developing countries would have opportunities to take part in the exploitation phase of ISS. One of the experiments on the station in which several South American universities and institutions would be participating involved research into the process of protein crystallization in the microgravity environment of space. Similar experiments had been made on several space shuttle missions. The objective would be to grow large protein crystals which, with their superior size and quality, would be better suited for structural analysis to develop a medicine against Chagas' disease. The disease was a tremendous regional health problem, affecting 16 million to 18 million people with 90 million to 100 million at risk. In combination with the systematic evaluation of hundreds of medicinal extracts acquired from plants in the rain forest, scientists might be able to develop a cure for the disease.

43. Project Pioneer was a cooperative project between the Ukraine and the United States to develop and deploy a teleoperated rover at the Chernobyl Nuclear Power Plant Unit-4 to characterize and monitor contamination levels and structural integrity, remove obstructions to enable facility access and retrieve contaminated materials for analysis. The Pioneer rover was based on NASA technologies developed for the Mars exploration programme. The rover was currently being tested and would be deployed in early 1999.

44. A presentation was made on the ongoing preparations for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), a special session of the Committee on the Peaceful Uses of Outer Space to be held in Vienna, Austria, from 19-30 July 1999. All States Members of the United Nations, international organizations, non-governmental organizations and space-related industries had been invited to attend the Conference. UNISPACE III would cover the rapid advances made in all fields of space science and technology since the last UNISPACE conference in 1982, the opportunities for space applications to provide social and economic benefits and the increased role of the private sector. Information about UNISPACE III and its planned activities were available on the Internet (http://www.un.or.at/OOSA/).

45. The session concluded with a panel discussion on international space cooperation and means of technology transfer for space technology applications. The participants stressed the importance of education and training in all fields of space technology applications. Through the use of the World Wide Web and other Internet resources, much of the training and education could be accomplished locally without the need for sending people abroad. For example, papers, publications, training manuals as well as whole data sets were easily accessible via the Internet. Participants also commented on the role of the private sector in promoting the technology and its applications. The private sector was already a dominating factor in the case of the telecommunications sector. The entry of private ventures into the Earth observation sector might also see a more competitive remote sensing data market. Participants also stressed that countries should establish committees or commissions to plan strategies for their technology development.

Notes

[1] See *Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space*, Vienna, 9-21 August 1982 (A/CONF.101/10 and Corr.1 and 2), para. 430.

[2] *Official Records of the General Assembly, Fifty-second Session, Supplement No. 20* (A/52/20), para. 39.

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Committee on the Peaceful Uses of Outer Space

Report on the United Nations Workshop on Space Technology for Emergency Aid/Search and Rescue Satellite-Aided Tracking System for Ships in Distress

(Maspalomas, Gran Canaria, Spain, 24 and 25 September 1998)

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I. Background

A. The International Agreement on the International Search and Rescue Satellite System

1. In time of danger or distress, including those associated with natural or anthropogenic disasters, providing an alert and associated location information is very critical to the mounting of any successful rescue operation. In 1984, Canada, France, the Union of Soviet Socialist Republics and the United States of America, desiring to strengthen the close international cooperation in this humanitarian endeavour, convinced that a worldwide satellite system to provide alert and location services for maritime, aviation and terrestrial distress and safety was important for the efficient operation of search and rescue, recalling the provisions of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, of 27 January 1967, and other multilateral agreements regarding the use of outer space to which they are party, and recognizing that it was therefore desirable to operate the International Search and Rescue Satellite System (COSPAS-SARSAT), in accordance with international law, so as to endeavour to provide long-term alert and location services in support of search and rescue and access to the System to all States on a non-discriminatory basis, and free of charge for the end-user in distress, concluded the International Agreement on the International Search and Rescue Satellite System (COSPAS-SARSAT) on 5 October 1984.

2. The purpose of the Agreement was:

(a) To assure the long-term operation of the System;

(b) To provide distress alert and location data from the System to the international community in support of search and rescue operations on a non-discriminatory basis;

(c) To support, by providing distress alert and location data, the objectives of the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) concerning search and rescue;

(d) To define the means by which the parties should coordinate the management of the System and cooperate with other national authorities and relevant international organizations in the operation and coordination of the System.

B. The Spanish Mission Control Centre

3. The Spanish Mission Control Centre, located at the National Institute for Aerospace Technology (INTA) satellite tracking station in Maspalomas, Gran Canaria, Spain, is one of the 30 ground receiving stations of the COSPAS-SARSAT global network (see figure 1). The station was established by the Government of Spain in 1993. In addition to COSPAS-SARSAT operations, it provides tracking, telemetry and control operations for Spain's MINISAT-01, serves as a back-up tracking, telemetry and control station for the MSG satellite of the European Organization for the Exploitation of Meterological Satellites, supports the Japanese ETS-VII satellite and acquires Earth resource data from the Land Remote Sensing Satellite (LANDSAT), the Satellite pour l'observation de la Terre (SPOT), the European remote sensing satellite (ERS), SeaStar, satellites of the National Oceanic and Atmospheric Administration of the United States of America and the Indian remote sensing satellite (IRS).

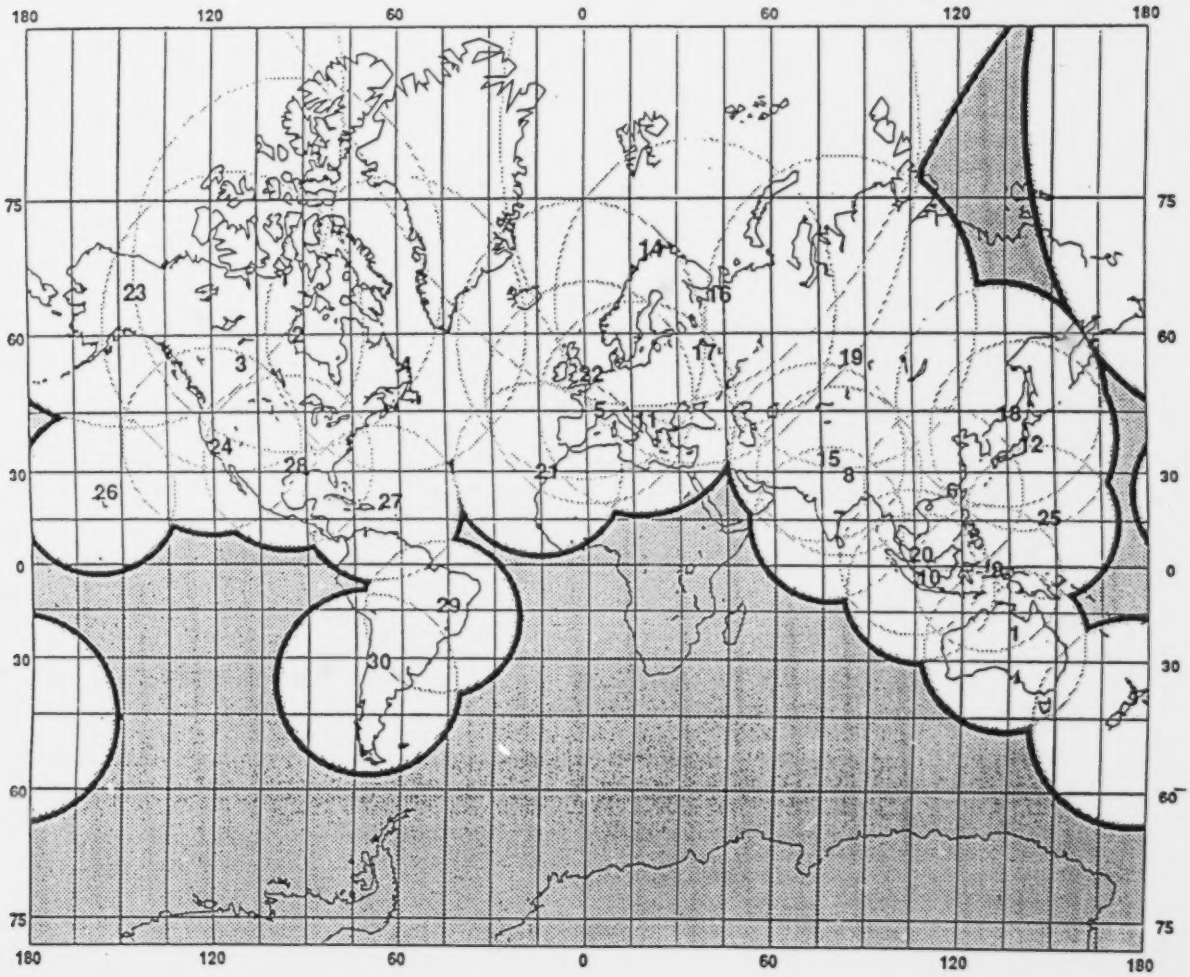
II. Organization of the Workshop

4. The Spanish COSPAS-SARSAT Mission Control Centre in Maspalomas is responsible for transmitting directly any alert signal received from any of the following 21 African countries: Benin, Cameroon, Cape Verde, Central African Republic, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo (see figure 2). All these countries can participate effectively in COSPAS-SARSAT life-saving programmes by investing in simple radio beacons whose alert signals can be identified, located and detected in time of danger and subsequently relayed to a rescue coordination centre. The absence of such a facility in many African countries has resulted in the loss of many lives that could have been saved, a situation that led to the organization of the Workshop.

5. The United Nations, in cooperation with the INTA Spanish Mission Control Centre and with the support of the European Space Agency (ESA) and the Spanish

Figure 1

Satellite visibility area of existing local user terminals in the International Search and Rescue Satellite System[a, b, c]



[a] Represents approximate System coverage at 121.5 MHz; at 406 MHz the System covers the entire globe.

[b] Local user terminals

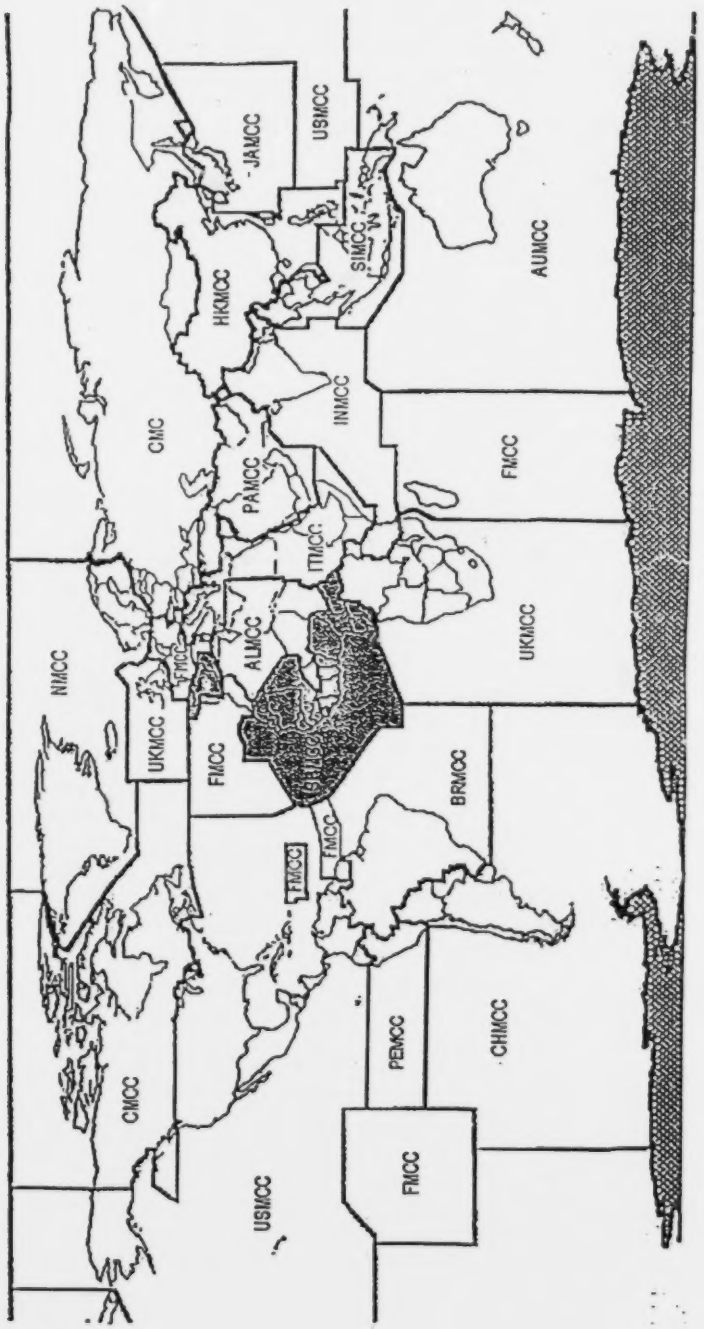
1 Alice Springs, Australia
2 Churchill, Canada
3 Edmonton, Canada
4 Goose Bay, Canada
5 Toulouse, France
6 Hong Kong
7 Bangalore, India
8 Lucknow, India
9 Ambon, Indonesia
10 Jakarta
11 Bari, Italy
12 Yokohama, Japan
13 Wellington
14 Tromso, Norway
15 Lahore, Pakistan
16 Archangelsk, Russian Federation
17 Moscow
18 Nakhodka, Russian Federation
19 Novosibirsk, Russian Federation
20 Singapore
21 Maspalomas, Spain
22 Lasham, United Kingdom of Great Britain and Northern Ireland
23 Alaska, United States of America
24 California, United States
25 Guam
26 Hawaii, United States
27 Puerto Rico, United States
28 Texas, United States
29 Brasilia
30 Santiago

[c] Satellite

Altitude 850 km
Elevation angle 5°

Figure 2

Service areas of the mission control centres[a]



[a]ALMCC Algerian Mission Control Centre
AUMCC Australian Mission Control Centre
BRMCC Brazilian Mission Control Centre
CMC Commonwealth of Independent States Mission Control
CMCC Canadian Mission Control Centre
CHMCC Chilean Mission Control Centre
FMCC French Mission Control Centre
HKMCC Chinese Mission Control Centre
INMCC Indian Mission Control Centre
ITMCC Italian Mission Control Centre
JAMCC Japanese Mission Control Centre
NMCC Norwegian Mission Control Centre
PAMCC Pakistan Mission Control Centre
PEMCC Peruvian Mission Control Centre
SIMCC Singapore Mission Control Centre
SPMCC Spanish Mission Control Centre
UKMCC United Kingdom Mission Control Centre
USMCC United States Mission Control Centre

Ministry of Foreign Affairs, organized a workshop that addressed the issue of search and rescue in the area covered by the Maspalomas station and possible operations in the concerned West African countries. The Workshop was held on 24 and 25 September 1998, at INTA in Maspalomas. It was organized to provide those countries within the footprint of the COSPAS-SARSAT station in Maspalomas with an opportunity to gain the necessary knowledge to enable them to galvanize their national authorities into action and to ensure that their respective countries participate in the COSPAS-SARSAT programme. At the opening session of the Workshop, Julio Melian, Director and Coordinator, INTA, welcomed all participants on behalf of the Government of Spain and INTA. Mr. Adigun Ade Abiodun, Expert on Space Applications of the Office for Outer Space Affairs, also welcomed all participants on behalf of ESA and the United Nations.

6. A total of 15 participants from 6 African countries (Cape Verde, Ghana, Nigeria, Senegal, Sierra Leone and Togo), Spain and the Office for Outer Space Affairs attended the Workshop. Participants were professionals at the level of director and senior programme managers associated with and/or responsible for the operating airlines of their country; the country's maritime agency and port authorities; the geological survey and land survey departments; the telecommunications industry; or the national disaster management board or bureau.

7. The Government of Spain (through INTA as well as the Ministry of Foreign Affairs) provided room and board for all the invited participants and was responsible for all the local logistics of the Workshop. ESA and the United Nations provided funds to cover the travel and en route expenses of the same participants.

III. Summary of the Workshop

A. The International Search and Rescue Satellite System

8. The Workshop was held in two different sessions, the first of which focused on practical programmes and related operations of COSPAS-SARSAT. Subsequent round-table discussions addressed the relationship between the Spanish Mission Control Centre in Maspalomas and the individual country's search and rescue point of contact. The participants paid a visit to the Maspalomas tracking station installation and subsequently a more elaborate visit to the COSPAS-SARSAT operation room. During that visit, a demonstration was conducted with the activation of a 406 MHz radio beacon and the related location calculation by the local user terminals, with an accuracy that was better than 1 kilometre. Participants also visited the Centre for Reception, Processing, Archiving and Dissemination of Earth Observation Data and Products (CREPAD), which is co-located at Maspalomas with the COSPAS-SARSAT station.

9. In support of the COSPAS-SARSAT programme, a number of satellites have been launched by the Russian Federation (Space System for Tracking Ships in Distress (COSPAS)) and by Canada, France and the United States of America (Search and Rescue Satellite-Aided Tracking System (SARSAT)). The International Search and Rescue Satellite System, which consists of a constellation of at least four satellites in polar orbit and a network of ground receiving stations, provides distress alert and location information to appropriate rescue authorities for maritime, aviation and land users in distress.

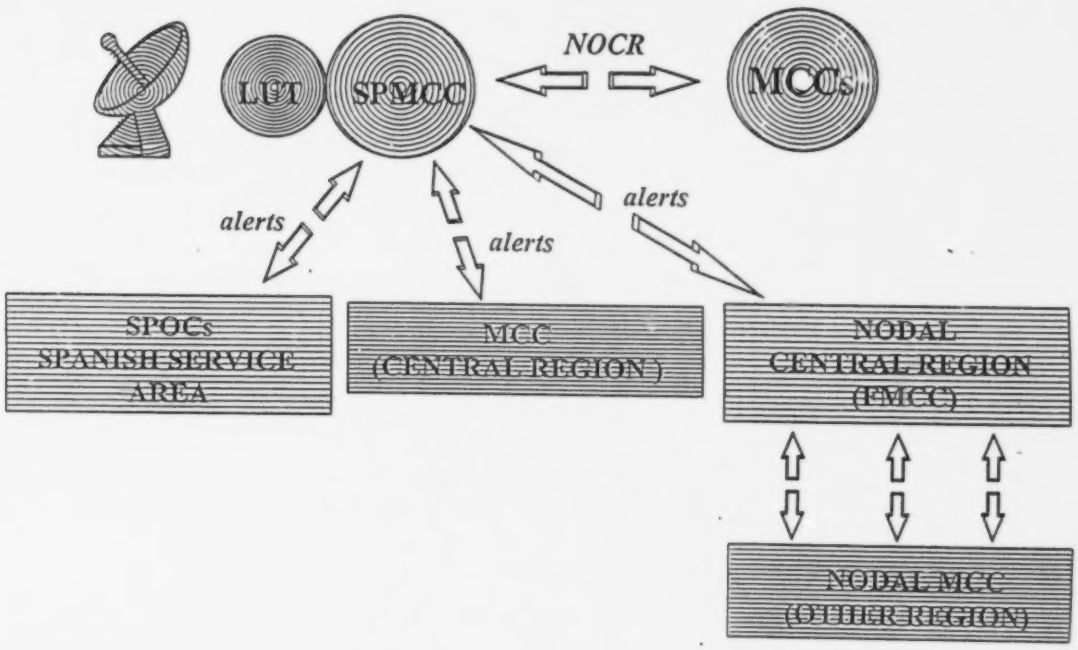
10. Operationally, COSPAS-SARSAT provides distress alert identification and location data to rescue coordination centres emitted from radio beacons, at a frequency of 406 MHz, which transmit alert and identification messages within the coverage area of COSPAS-SARSAT ground stations' local user terminals and, in some cases, outside that coverage area anywhere in the world. Complete coverage of the Earth, including the polar regions, can be achieved using simple emergency beacons to signal distress. Figure 1 shows the satellite visibility area of existing COSPAS-SARSAT local user terminals.

11. The Workshop exposed the participants to COSPAS-SARSAT operations, including the procedure for distribution of alert signals, once they are received at the Maspalomas station, as shown in figure 3. The procedures for distribution of data, once they are received, are shown in figure 4.

12. **COSPAS-SARSAT radio beacons**. There are three types of radio beacon: aviation emergency locator transmitters, maritime emergency position-indicating radio beacons and personal locator beacons. These beacons transmit signals that are detected by COSPAS-SARSAT polar-orbiting spacecraft equipped with suitable receivers and the signals are then relayed to COSPAS-SARSAT local user terminals, which process the signals to determine the location of the radio beacon that is transmitting the signals. Alerts are then relayed, together with location data, via a mission control centre either to another mission

Figure 3

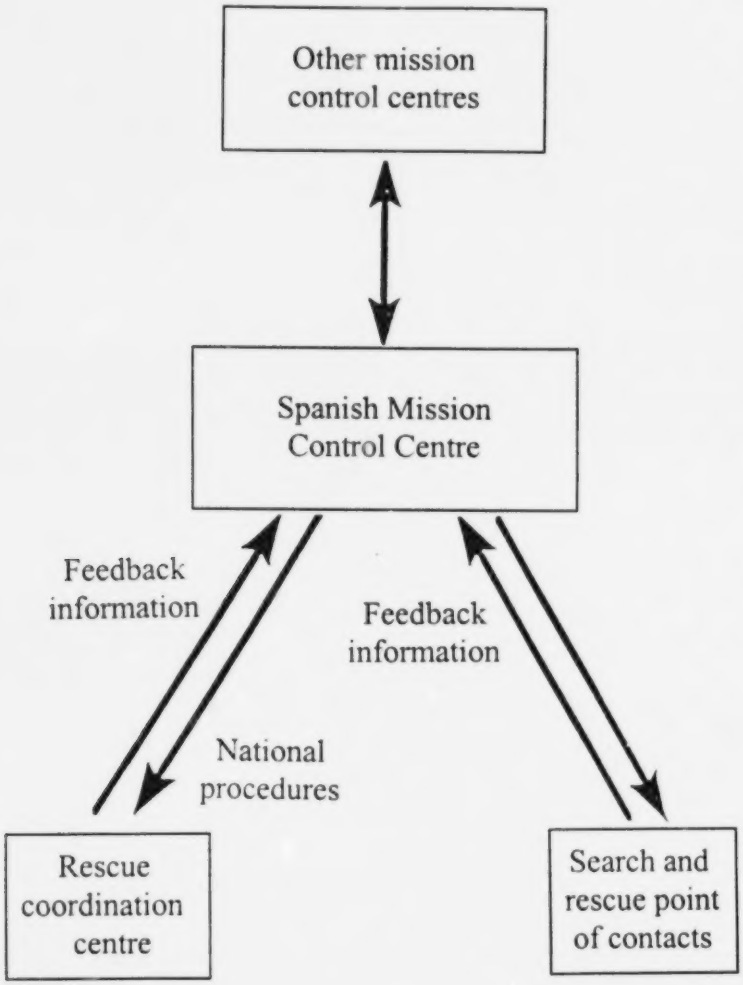
Procedure for the distribution of alert signals from the Spanish Mission Control Centre[a]



[a] FMCC French Mission Control Centre
LUT Local user terminal
MCC Mission control centre
NOCR Notification of country of registration
SPMCC Spanish Mission Control Centre
SPOC Search and rescue point of contact

Figure 4

Procedures for the distribution of data in the International Search and Rescue Satellite System



control centre or to the appropriate search and rescue point of contact or rescue coordination centre.

13. While the emergency locator transmitters are automatically activated on impact and are designed to survive such impacts, the emergency position-indicating radio beacons can be activated both automatically and manually and are designed to remain floating constantly. The personal locator beacons, which are for personal use, are activated manually and are generally used for scientific and sport expeditions in remote and isolated areas. In all cases, the operating battery lifetime for each of the radio beacons is 48 hours.

14. The first generation of distress beacons (590,000 in service to date) operated worldwide at a transmission frequency of 121.5 MHz. The latest generation, with about 135,000 in service, operate at a transmission frequency of 406 MHz. The following are the reasons for the upgrade of the transmission frequency from 121.5 MHz to 406 MHz: characteristics of the 121.5 MHz radio beacon included the low emission power of 0.1 watt; all beacons emit the same signal; there is no identification code; and there is a 25-50 km average location error. The characteristics of the new generation of 406 MHz radio beacons include high emission power (5 watt); periodic distress emissions; identification message code for maritime emergency position-indicating radio beacons, aviation emergency locator transmitters and personal locator beacons/country code/identification registration; and a 0-5 km average location error.

15. **Operational problems and possible solutions**. False alerts and interferences (40,000 detected in 1996) are the major operational problems often encountered in the use of the beacons. Two interferences in the 406 MHz band on 28 December 1996, which resulted from clandestine emissions from neighbouring countries, prevented the identification of the alert signals from the activated 406 MHz radio beacon of the Greek ship, the Dystos, resulting in the loss of life of 20 crew members.

16. Problems of false alerts can be addressed through (a) periodic inspections of radio beacons; (b) user education; (c) the mounting of receivers on the bridges of ships; and (d) through post-flight inspection of aircraft. The vigilance of local telecommunication authorities and the issuance of clear instructions by them on the dedicated use of the 406 MHz frequency band for search and rescue is very critical. Clandestine use of the 406 MHz frequency band should neither be encouraged nor go unreported. The roles of both ITU and IMO in ensuring compliance are critical.

17. **Search and rescue operations to date**. The first satellite of the COSPAS-SARSAT system, COSPAS-1, was launched on 30 June 1982. Shortly after the satellite went into operation, it began relaying signals from a downed aircraft in the Rocky Mountains in western Canada. All three persons aboard the aircraft were soon rescued. Similar stories have repeated themselves many times and from the beginning of its operations in 1982 until 1997, the COSPAS-SARSAT system with its current constellation of six satellites has been used in 2,635 search and rescue events for the rescue of 8,638 people. In 1997 alone, 1,284 people were rescued in 388 COSPAS-SARSAT search and rescue missions.

B. National status reports

18. **Cape Verde.** Two different ministries are concerned with search and rescue operations, the Ministry of Defence, through the Coast Guard, and the Ministry of the Sea and the Air, through civil aviation and the merchant navy. The search and rescue service is still not completely organized and the establishment of two centres is planned. Communication facilities, within both the military and civilian sectors, include telex and high-frequency and very high-frequency services. One small ship (15 m) and two small planes (Dornier) are available for search and rescue services. The acquisition of a bigger ship is expected in the immediate future.

19. **Ghana**. The National Disaster Management Organization was created in 1996 under the National Security Council for the management of areas affected by disasters and similar emergencies, for the rehabilitation of persons affected by disasters and to provide for related matters. Eight different committees have been created, covering geological disasters, meteorological disasters, lightning disasters, pest and insect infestation disasters, epidemic disasters, social and ethnic disasters, food security and relief and reconstruction. The Organization also works in close cooperation with neighbouring countries. There are no regulations on the use of 406 MHz emergency locator transmitters, but it seems feasible to introduce such regulations in the near future. The aeronautical fixed telecommunications network line has so far proved fully reliable. However, a west African satellite communications centre is planned and could constitute a future link to

the Spanish Mission Control Centre. Ghana also coordinates search and rescue activities in Benin and Togo.

20. **Nigeria**. The National Maritime Authority has overall responsibility for search and rescue operations, although in 1997 the Inland Water Agency was created to deal with this kind of disaster. The National Maritime Authority has not yet made the use of 406 MHz beacons obligatory. The country is divided into two regions, the eastern and western. Other agencies (air force, police, civil aviation, merchant navy) support search and rescue activities under the coordination of the National Maritime Authority. The Authority has two helicopters available for search and rescue operations. Since February 1998, Nigeria has complied with the IMO Global Maritime Distress and Safety System agreement.

21. **Senegal.** Senegal is going to designate a point of contact for all matters concerning COSPAS-SARSAT. The Rescue Coordination Centre in Dakar, which acts as a coordination centre for coastal operations, is equipped with eight stations and a variety of communication infrastructure (high-frequency, very high-frequency, radar, etc.). In addition, eight boats and one plane are available for search and rescue operations. A subregional commission on fisheries, composed of six countries, works in accordance with coordinated search and rescue plans.

22. **Sierra Leone**. Sierra Leone has a Search and Rescue Committee under the Civil Aviation Directorate. The latter is composed of four oversight bodies that support national search and rescue operations. Contributing to those activities are the rescue authority (one boat); the Air Force (one helicopter); and the Navy (one speedboat). The major problems are communications, reaction time to emergencies and training facilities for search and rescue officers.

23. **Togo.** Togo comes under the search and rescue coordination of Ghana. Search and rescue operations are managed by the Air Force and the Navy. Togo's rescue coordination centre has the following resources: three high-speedboats, a radio station and two navy boats. Togo representatives will meet with the heads of the Air Force and Navy to work on COSPAS-SARSAT issues.

IV. Conclusion

24. It was proposed that a centre should be established in West Africa to work with the Spanish Mission Control Centre in order to encourage sharing of resources between the different countries:

(a) Each country should engage in a national dialogue on COSPAS-SARSAT issues with input from the Government and related organizations (such as civil aviation, maritime organizations, the air force, the navy and the natural disaster agency);

(b) Each country should designate a head of the national COSPAS-SARSAT delegation and a lead agency and send details to INTA before January 1999;

(c) Each country should designate a search and rescue point of contact and notify INTA;

(d) Each country's search and rescue point of contact should start sending feedback messages in response to messages from the Spanish Mission Control Centre;

(e) In order to participate effectively in the COSPAS-SARSAT programme, each 406 MHz type-approved radio beacon purchased for that purpose needs to be properly registered within its own country (see annex I for a sample registration card).

25. It was agreed that periodic COSPAS-SARSAT meetings were needed. The organization of such periodic meetings would be predicated upon the efforts of each country to establish the necessary COSPAS-SARSAT programme at the national level. At such meetings a national status report should be provided by each country in accordance with the format presented in annex II.

26. The Office for Outer Space Affairs of the Secretariat is prepared to work with INTA to facilitate the establishment of an appropriate COSPAS-SARSAT network in each participating African country, contingent upon the commitment of each country to establish the necessary facilities at the local level and to train the necessary manpower to operate and manage such a programme.

Annex I

Sample registration card[a]

A. Front side

406 MHz COSPAS-SARSAT distress beacon registration card

1. Instructions for manufacturers/retailers: Please complete this section of the card.
Make of beacon: ..... Model: .....

If the beacon is: (please tick √)

- ☐ a maritime EPIRB, please ask purchaser to fill in sections 2 and 3; or
- ☐ an aviation ELT, please ask purchase to fill in sections 2 and 4; or
- ☐ a personal locator beacon (PLB), please ask purchaser to fill in section 2; and

provide purchaser with address of registration authority as provided for on reverse side.

The unique 15-character hexadecimal beacon identification code must be provided below (bits 26-85 of digital message).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

2. User data: To be provided by owner:

Owner's name: ..... Address: .....

.....

Telephone: (home) ..... Telephone: (work).....

Emergency contacts:

Name: ..... Name: .....

Telephone: (home): ..... Telephone: (home): .....

Telephone: (work): ..... Telephone: (work): .....

3. EPIRB: Details of vessel

Vessel name: .....

Vessel reg. number: .....(if applicable)

Radio call sign: .....

MMSI numbers (9 digits): .....

Vessel length: ..... Gross tonnage: .....

Home port: .....

Max. number of persons on board: ☐ less than 5 ☐ 5 to 25 ☐ more than 25

☐ Sail ☐ Power inboard ☐ Power outboard

☐ Other propulsion, specify: .....

Colour of vessel: .....

Communication/navigation. (please tick √)

VHF ☐ MF ☐ HF ☐ DSC☐

Inmarsat-A ☐ - B ☐ - C ☐ - M ☐

Inmarsat phone numbers: .....

Other com. (e.g. cellphone No.): .....

Global nav. sat. systems (GPS/GLONASS) ☐

Other primary nav. systems: .....

4. ELT: Details of aircraft

Type designator: .....

Aircraft registration marks: .....

or, Aircraft operator: .....(3-letter code)

Home airport: .....

Max. number of persons on board: ☐ less than 5 ☐ 5 to 25 ☐ more than 25

Colour of aircraft: .....

Communication/navigation: (please tick √)

VHF ☐ UHF ☐ HF ☐ SATCOM voice ☐

Data ☐ VOR ☐ DME ☐ ADF ☐

Inertial nav. ☐ RNAV ☐

GLONASS/GPS) ☐

Other nav. systems:.....

See instructions for purchaser/user on the reverse side of this card

B. Reverse side

5. Instructions for purchaser/user

The 406 MHz COSPAS-SARSAT distress beacon you have purchased **must be registered** with the appropriate national authority in the country identified by the country code in bits 27-36 of the beacon identification code.

After purchase, please complete this registration card and mail it to the address indicated below (as provided by the manufacturer/agent) or enquire with appropriate national authority for registration.

This card can also be used to notify change of ownership or transfer of beacon.

If your beacon has been recorded, please enter below the 15 hexadecimal characters of the *OLD beacon identification code*:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

Note

The following countries have specified their own requirements for registration. Please use the appropriate national form: Australia, Canada, Chile, France, Norway, Russian Federation, Sweden, United Kingdom and United States of America.

Address of registration authority
(To be provided by manufacturer/agent)

.....

.....

.....

.....

Fax No.: ..... Tel. No.: .....

[a]

ADF	Automatic direction finder
COSPAS-SARSAT	International Search and Rescue Satellite System
DME	Distance-measuring equipment
DSC	Digital selective calling
ELT	Emergency locator transmitter
EPIRB	Emergency position-indicating radio beacon
GLONASS	Global Orbiting Navigation Satellite System (Russian Federation)
GPS	Global positioning system
HF	High frequency
Inmarsat	International Mobile Satellite Organization
MF	Medium frequency
MMSI	Maritime mobile service identity number
PLB	Personal locator beacon
RNAV	Area navigation
SATCOM	Satellite communications
VHF	Very high frequency
VOR	Very high frequency omnidirectional range

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Committee on the Peaceful Uses of Outer Space

Report on the United Nations/International Astronautical Federation Workshop on Expanding the User Community of Space Technology Applications in Developing Countries

(Melbourne, Australia, 24-27 September 1998)

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I. Introduction

A. Background and objectives

1. The General Assembly, in its resolution 37/90 of 10 December 1982, decided that, in accordance with the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space,[1] the United Nations Programme on Space Applications should assist the developing countries in establishing an autonomous technological base for the development and use of space technology by promoting the growth of indigenous capabilities. The Committee on the Peaceful Uses of Outer Space at its fortieth session, held in June 1997, endorsed the programme of workshops, training courses and seminars proposed for 1998 by the Expert on Space Applications.[2] Subsequently, the General Assembly, in resolution 52/56 of 10 December 1997, endorsed the United Nations Programme on Space Applications for 1998.

2. The present report contains a summary of the presentations and discussions of the United Nations/International Astronautical Federation Workshop on Expanding the User Community of Space Technology Applications in Developing Countries. The Workshop was organized as part of the 1998 activities of the Office for Outer Space Affairs of the Secretariat under the United Nations Programme on Space Applications. It was the eighth workshop in this series, and was held in Melbourne, Australia, in conjunction with the forty-ninth Congress of the International Astronautical Federation (IAF). The Workshop was locally supported by the Cooperative Research Centre for Satellite Systems.

3. Presentations at the seven previous United Nations/IAF workshops held from 1991 to 1997 in Austria, Canada, China, Israel, Italy, Norway and the United States of America have demonstrated the utility of space technology applications for accelerating the social development and economic growth, as well as protecting the environment, of developing countries. Well-known examples are meteorological satellite applications, satellite telecommunications, Earth observation applications and the use of navigation, positioning and localization systems. However, despite the broad range of potential applications, many of them are still restricted to a relatively small and specialized user community. Especially in developing countries, potential users and decision makers are sometimes simply unaware of the full capabilities and benefits of space technology applications.

4. The Workshop focused on how space technology applications can serve a larger and more varied user community. It also aimed at: assisting developing countries in establishing and strengthening national capabilities in space technologies and applications; providing them with an insight into the benefits of establishing cost-effective industrial and institutional enterprises in selected fields of space science and technology; exploring the possibility of increased scientific and technical cooperation between developed and developing countries, as well as among the developing countries themselves; and considering possibile cooperative ventures involving space industry and developing countries. Those aims were accomplished by identifying existing obstacles, by suggesting possible solutions and by presenting new, innovative applications of space technology. The Workshop was also intended to provide participants with a forum for interaction with representatives of the space industry, thereby helping the participants to gain a greater understanding of the needs and requirements that should be met if ventures were to be successful. The observations of participants and the conclusions reached by the Workshop will also provide inputs and ideas to the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), which will be held at Vienna from 19 to 30 July 1999.

5. The present report, covering the background and the objectives of the Workshop, as well as the presentations and discussions, the observations made and the conclusions reached by the participants, has been prepared for consideration by the Committee on the Peaceful Uses of Outer Space at its forty-second session and by its Scientific and Technical Subcommittee at its thirty-sixth session. The participants will report to the appropriate authorities in their own countries. The proceedings of the Workshop, including a detailed address list of all participants, will be made available through the Office in due time.

B. Programme of the Workshop

6. During the course of the Workshop, successful examples of the use of space technology applications were presented. The programme of the Workshop was developed to demonstrate how developing countries could

benefit from the use of space technology for economic and social development and how the user community, and therefore also the community of benefactors, could be expanded. The Workshop was structured around six sessions, in which 28 invited papers were presented. There was a vigorous exchange of information, comments, questions, recommendations and suggestions. In addition, a number of brief presentations by participants from developing countries provided an insight into the status of space technology applications in their respective countries. Afternoon sessions concluded with panel discussions, followed by an open exchange of views.

7. National and transnational space projects and programmes were discussed, and possibilities were suggested for increased scientific and technical cooperation between developed and developing countries, as well as among the developing countries themselves.

C. Participants

8. The United Nations, on behalf of the co-sponsors, invited developing countries to nominate candidates for participation in the Workshop. Selected participants were required to have university degrees in remote sensing, communications, engineering, physics, biological or medical sciences or other fields related to the themes of the Workshop. In addition, participants were selected on the basis of their working experience in programmes, projects or enterprises in which space technology is or could be used. The participation of specialists at a decision-making level from both national and international entities was specifically encouraged.

9. Funds allocated by the Government of Australia, the United Nations, the Centre national d'études spatiales (CNES) (French National Centre for Space Studies) and IAF for the organization of the Workshop were used to cover international air travel and per diem expenses of more than 30 participants from developing countries. Co-sponsors also covered the cost of registration fees for participants from developing countries to participate in the forty-ninth IAF Congress, which was opened immediately following the United Nations/IAF Workshop, enabling them to engage in discussions with their colleagues in one of the more important international space events.

10. The Workshop was attended by more than 100 participants, including funded participants from Argentina, Azerbaijan, Bangladesh, Brazil, Cambodia, China, India, Indonesia, Iran (Islamic Republic of), Kenya, the Lao People's Democratic Republic, Malaysia, Mongolia, Morocco, Nigeria, Pakistan, Philippines, Republic of Korea, Sri Lanka, Sudan, Tunisia, Uzbekistan, Zambia and Zimbabwe.

11. Invited presentations were delivered by representatives of the Office for Outer Space Affairs, the Arthur C. Clarke Institute of Modern Technologies (Sri Lanka), the Bangladesh Space Research and Remote Sensing Organization, the Brazilian Space Agency, the Chinese Academy of Space Technology, the Centre Royal de Télédétection Spatiale of Morocco (Royal Centre for Remote Sensing), the European Space Agency, the Indian Space Research Organization, the International Space University, the National Aeronautics and Space Administration of the United States, the National Space Development Agency of Japan, the National Aerospace Laboratory of the Netherlands, the Pakistan Space and Upper Atmosphere Research Commission and the University of New South Wales (Australia).

12. Presentations were also delivered by representatives from private industry, including the following: Alcatel (France), AUSSPACE (Australia), BRAZSAT (Brazil), Iridium (United States), Northrop Grumman Corporation (United States), Geomatic Technologies/SpaceImaging (Australia/United States), SPACEHAB (United States), Surrey Satellite Technology Ltd. (United Kingdom of Great Britain and Northern Ireland), Telstra (Australia), The Aerospace Corporation (United States), and WorldSpace India (India).

II. Observations and conclusions

13. Some of the organizers of the United Nations/IAF Workshop series who had participated since the first one noted the increase of awareness of developing countries of, and their involvement in, space activities. While the presentations given by participants from emerging space-user countries and developing countries in general gave an impressive picture of the space activities in those countries, they still faced certain hurdles in implementing such activities on a continuous basis because of a number of problems. These included the issues of education and training of people and the optimal utilization of experts, the need for regional and global cooperation and the importance of convincing policy and decision makers.

14. Participants from developing countries often counted on the United Nations to implement and spearhead programmes. However, the United Nations had limited resources and the Office was limited in the activities it should pursue in following the directives provided by the Committee. It was therefore up to Workshop participants and experts in developing countries in general to approach the policy and decision makers in their countries and to persuade them to take a more active role within the Committee. UNISPACE III would be an ideal forum for presenting the needs of emerging spacefaring States and developing countries and charting the way forward for regional and global cooperation in the near future. Awareness-raising should start at a national level and should not depend on external initiatives.

15. The need for regional space agencies to make possible the regional sharing of solutions was stressed by several participants. Especially in the field of small satellite projects, for example, the development of a constellation of remote sensing satellites to provide disaster warning and management services should be promoted rather than developing independent costly systems in each country. Several organizations and committees already existed to coordinate activities in remote sensing and space applications, and developing countries should use the occasion of UNISPACE III to establish links with such entities and to voice their opinions. Participants were called upon to approach their national delegations to UNISPACE III so that proper contact could be established with policy and decision makers in their countries who would in turn make and support proposals to the United Nations.

16. It was furthermore stressed that a national commitment and a long-term plan were necessary for continued development of space activities and use of space applications. Space policies should be formed in harmony with other existing national policies, striving for balance with the commercial sector in order to be successful. Existing programmes and frameworks for international cooperation must be utilized and promoted. Regional organizations should be established to promote space applications through international cooperation. The education of the young generation of future space managers and professionals was a precondition for the continuity and successful development of space activities in emerging spacefaring States and developing countries.

17. With respect to microgravity research programmes, it was recommended that future Workshops and conferences organized by the United Nations should continue to inform emerging spacefaring States and developing countries about opportunities to participate in such projects.

III. Presentations and discussions

18. The Director of the Office for Outer Space Affairs welcomed the participants to the eighth United Nations/IAF Workshop. In his opening statement he referred to the growing economic importance of space technology applications in the world and to the large gap that still existed in this field between developed countries and the developing countries. The main objective of the Workshop series was to identify the obstacles that prevented developing countries from obtaining benefits from those technologies. Solutions should be developed to address and to surmount obstacles by means of increased national commitment and by strengthening international cooperation. In that context, the participants were also briefed about the latest developments with regard to UNISPACE III. The international space community saw UNISPACE III as a major potential milestone towards preparing and coordinating space activities in the early twenty-first century.

19. The Executive Director of the Cooperative Research Centre for Satellite Systems, in his welcoming presentation, reviewed the status and role of space technology applications in the world. In the past, space technology had been developed and used by the wealthy, industrialized countries, in many cases driven by military objectives. The cost of space technology, the strong political differences and the lack of technology prevented smaller, less wealthy countries from benefiting from space technology. However, that situation had changed in recent years with political aspects becoming less important and with the growing commercial importance of space applications. He predicted the gradual expansion of the space-technology user community based upon the availability of more affordable, more accurate, more diverse and accessible solutions. All countries—developed and developing—could now greatly benefit from using space technology applications, expanding the user community of space technology applications.

20. In his keynote address, the chairman of the Indian Space Research Organization (ISRO) discussed the benefits of space technology to society. Today, the global space industry had become one of the largest industries in

the world, with an annual revenue of about $80 billion and more than 800,000 people employed worldwide. While in developed countries space benefits had been touching almost all social segments, industries and academic institutions, developing countries were still facing constraints in terms of resources, policies and awareness at different levels, which had to be removed through appropriate adjustments in policies, human resources development, institutional frameworks and international support, coupled with balanced commercial mechanisms. There were tremendous opportunities for expanding space applications. Nearly two thirds of the total global population of 6 billion people lived in developing countries. Those 4 billion people possessed less than 3 per cent of all telephones and 10 per cent of all television sets in use today. There was a growing demand for mobile communications in developing countries, demonstrated by the fact that the percentage of subscribers to mobile services was often comparable to the numbers in developed countries. Other applications included the use of geographic information systems (GIS) and remote sensing data for agricultural applications. The growing population demanded that agricultural productivity would have to be raised from the current level of 1 to 2 tons per hectare to 4 to 5 tons per hectare. Remote sensing data could also help in securing access to safe drinking water and play an important role in disaster management applications. With a literacy rate of greater than 98 per cent and a per capita annual income of greater than $8,000 in developed countries, compared to a 50 to70 per cent literacy rate and an annual per capita income of about $600 in developing countries, space communications was also of growing importance for spreading education rapidly to illiterate populations in rural areas.

A. Establishing and enhancing the use of space applications in developing countries

21. The recommendations and achieved objectives of previous United Nations/IAF workshops in the series were reviewed and a brief overview of current activities of some participants in the series was presented. It was reiterated that the purpose of the workshops was to provide developing countries with a forum to discuss concepts for the development and use of space science and technology tailored to their needs. While some of the recommendations of earlier workshops had already been addressed and partially resolved, others had continued to require attention, including the need to convince government officials and decision makers about the benefits of space technology applications. It was pointed out that other recurring concerns regarding funding, data, equipment and software acquisition, education and training, as well as end-user and private sector investment, had been and would continue to be addressed in future workshops. Such concerns would surface frequently in future discussions, since a growing number of developing countries were starting to implement space technology applications and facing similar problems in the initial implementation phases.

22. Experience had taught that the successful introduction of space technology applications in developing countries required the support of policy and decision makers. It was therefore necessary to raise and increase the awareness of policy and decision makers with respect to the benefits of space technology applications. The Director-General of the Brazilian Space Agency underscored the benefits that could be gained from space technology applications, particularly through improving the daily lives of people. The presentation covered the experience and current activities of Brazil in space technology and highlighted the multidisciplinary requirements of and the multitechnology approach to space activities. Cost-sharing of some space activities between Government and industry were also discussed. The importance of fiscal incentives and funding support for education and training as well as research and development was stressed. Brazil was currently investing in a programme that would result in giving the country an independent capability for space access. It included the development of a launch vehicle, the construction of a launch site and the design and construction of satellites and payloads for a broad range of applications. International cooperation with partner institutions in Argentina, China, France and the United States had been a good strategy for Brazil to reduce the cost and risk of its programmes. The Brazilian Space Agency was continuing to identify potential partners and countries with a view to finding and developing common solutions.

23. Once the political support was ensured, countries should engage in drafting space policy plans to effectively coordinate and enhance the use of space technology applications. The director of the Arthur C. Clarke Institute of Modern Technologies stated that a national space policy was a prerequisite for coordinated use of space applications in the development of a country. The space policy of a country depended on its technological and financial capabilities as well as its maturity in mastering space technology applications. The presentation emphasized the need for considering the ramifications of various space

technology applications as well as the essential elements that should be embodied in the space science and technology policy of a developing country such as Sri Lanka. That included accepting space science and technology as an integral part of the broad area of science and technology, which had the following aims: to achieve economic development and human well-being; to give priority to areas of space applications in which direct results could be achieved and benefits accrued to the common people; to utilize the knowledge and technology gained by other advanced countries rather than trying to reinvent the wheel; to provide education and training in space science and technology to develop some self-reliance in the field, and to ensure that space policy would not be easily thrown off course from political expediency by changing Governments.

B. Training users of space applications

24. One precondition for the effective implementation of space policy plans was the availability of experienced and trained staff. Training opportunities for space experts as well as the education of users of space technology applications had been a major concern raised during previous United Nations/IAF workshops.

25. The inauguration of the regional Centre for Space Science and Technology Education in Asia and the Pacific in 1995, the first of several such centres planned to be established under the United Nations Programme on Space Applications, was an important milestone in addressing the training and education needs of that region. The Scientific Secretary of ISRO introduced the work of the Centre, established in India with the goal of increasing knowledge and understanding in space science and technology among participants in its education programmes, thereby contributing to the enhancement of national and regional capabilities. In the future, the Centre should become a centre of excellence by expanding its outreach and offering activities other than education, such as research and consulting services.

26. The International Space University (ISU) was offering programmes in interdisciplinary space education. An ISU representative described the changes in the global political environment and the resulting changes in the space sector. Space education must strive to meet the new needs and challenges of a changing world. The international character of space activities created the necessity for multidisciplinary professionals with a multinational outlook to bridge the gaps between the different groups involved in space programmes.

27. Education had become a necessity for a better future of humankind. Developing countries faced the problem of providing education to a growing population in rural areas. Distance education using satellite technology offered the possibility of high-quality education to anyone on the globe. The General Manager of WorldSpace, India, described the WorldSpace digital sound broadcasting system, consisting of three geostationary satellites, for distance education and applications to address current needs for distance education in rural areas. Although receiver terminals were still relatively costly, it was expected that prices would eventually come down. The system had been fully designed with the conditions in developing countries in mind, for example, by equipping receivers with solar-powered batteries. The WorldSpace system will mainly provide educational programming targeted towards adult education. It would also be used for providing supporting teaching material to teaching personnel.

28. The marketing and business development manager of Northrop Grumman Corporation provided an overview of the major activities of the company in space technology applications that could be of interest to developing countries, focusing on a future synthetic aperture radar (SAR) system with 5-metre resolution developed for small satellite platforms. A radar system could provide all-weather data of special interest to equatorial regions that were frequently hidden under cloud cover. The company was also providing training in image processing at its Spectral Imagery Training Center on a commercial basis. It was promoting real-time GIS that would allow the linking of real- and near-real-time data sources directly into GIS to enable better decision-making for environmental and agricultural applications, for the sustainable use of natural resources, and for transportation, hydrology, tracking and tagging and defence matters. In the future, the aim was to combine such GIS with real-time or near-real-time data acquired from Earth Observation satellites. Such an application would be an important step towards the operational use of high-resolution remote sensing data beyond what was already currently possible with data acquired from meteorological satellites or advanced very high-resolution radiometer data at low resolution (in the 1-kilometre range), and would allow the use of such data in new application fields, contributing to expanding the user community for space technology applications. However, because of technological constraints in the space and ground segment and in computing power, it would still

take some time until such real-time GIS using remote sensing data acquired by satellites would be commercially available.

29. The Earth Science programme of NASA included many activities of relevance to the region of Asia and the Pacific and offered several opportunities for international participation. One such opportunity consisted in the recent and planned airborne SAR deployments carried out in parallel to flown and future C-band spaceborne imaging radar (SIR-C) and X-SAR mapping campaigns conducted from the Space Shuttle. Data were collected for agencies and universities in Australia, Brunai Darussalam, Cambodia, Malaysia, New Zealand, Papua New Guinea, the Philippines and Thailand. Applications included the study of cultural resources, land-use studies, natural hazards, geology and mining and urban studies. Earth imaging radar materials could be obtained from the World Wide Web at http://southport.jpl.nasa.gov/.

30. Global Learning and Observations to Benefit the Environment (GLOBE) was an international science and education programme bringing together students, teachers and scientists to enhance the environmental awareness of people throughout the world, to contribute to the scientific understanding of Earth and to support improved student achievement in science and mathematics. The initiative was launched on 22 April 1995, on the occasion of Earth Day. Internationally, GLOBE was being implemented through bilateral agreements between the Government of the United States and Governments of partner States. More than 120 States had expressed interest in GLOBE, and over 70 had signed GLOBE agreements. GLOBE measurements had been selected by the international science community and were used in ongoing research. The measurements included data for atmospheric and climate studies, hydrology studies, soils studies, land cover and biology studies. Further information could be obtained from GLOBE at http://www.globe.gov/.

31. During the first panel discussion on the theme "Expanding the user community of space technology applications: opportunities and constraints", panelists noted the changing geopolitical situation in the world and its impact on the development of space technology. The changing economic and political environment, bringing with it the growth of commercial space activities, the deregulation of the telecommunications and trade sectors, the integration of the global market and the information society, had led to an increasing demand for space technology applications. However, in some countries, those changes had not brought about the expected easier access to space benefits. They had rather resulted in constraints that prevented potential users from benefiting from those opportunities. One reason was that national policies sometimes did not keep pace with the swift technology changes and required updating. Participants concluded that Governments should provide incentives and encourage competition in the private sector, but should still continue with funding and carrying out space-related activities needed for the well-being of society (for example, in the fields of education and the environment), but which could not yet be conducted on a commercial basis.

32. Participants suggested that the Office for Outer Space Affairs should establish a programme specifically designed for educating policy makers and legislators on space applications and their derived benefits. The language barrier between decision makers or potential users and space experts, for example, through the overuse of technical or legal terms, was identified as a major hurdle. The hope was expressed that a programme taking that issue into account would help to accelerate the formulation of space policy plans and increase the commitment of a country to the implementation and operational use of space technology applications. It was noted that the Office had already been charged with organizing UNISPACE III, which would be held at the ministerial level. In preparation for the Conference, a package of 12 background papers had been prepared, each containing a summary of the state of and the benefits from space technology applications in a non-technical language. Participants agreed that awareness-raising should start at the national level.

33. A major issue for developing countries was the operationalizing of remote sensing applications. A comparison was made between the remote sensing field and satellite communications. The remote sensing market had not been growing as quickly as the satellite communications market. Remote sensing projects had mostly been limited to pre-operational applications. The problem was that remote sensing applications must sell information, not data, as was the case with telecommunications. However, it had proven to be difficult to extract the kind of information that was relevant and useful to the decision makers using that information. In other cases, the information was extracted, but it is was difficult to convince decision makers of its actual use.

C. Small satellite and microsatellite systems for promoting space capabilities and applications

34. The Secretary-General of the Chinese Academy of Space Technologies presented the development history of the Chinese small satellite programme. China was following the worldwide trend of developing small satellites that had shorter project times from conceptualization to operation and lower costs of development as well as launching. Several projects were in the engineering development stage or in the conceptual study phase. The Practice-5 (SJ-5) satellite would conduct scientific and technical experiments and demonstrate the platform technology. The first application satellite using the small satellite platform operationally would be Oceansat-1 (HY-1). It would be used mainly for the observation of sea fish distribution, marine-life breeding resources and the distribution of mud and sand in river mouths and ports. A project in the conceptual study phase was the Asia-Pacific Small Multi-Mission Satellite (SMMS), developed in cooperation with other Asian countries. SMMS would be based on the SJ-5 satellite bus platform and mainly carry remote sensing instruments. Ka-band communication and space environment experiments, as well as a constellation of satellites for environment and disaster monitoring, were also under study. The latter would be based on a constellation of six low-Earth-orbit satellites, four operating in the optical regime and two SAR satellites providing an all-weather capability. China had realized the need for radar-based observation systems because of the flood disasters experienced by the country in 1998. Such a small satellite constellation would achieve short-time resolution and reasonable spatial resolution while keeping an acceptable cost limit.

35. The Deputy Director-General of the Department of Foreign Affairs of the China National Space Administration highlighted the role of space technology in planning, monitoring and managing resources. He gave a detailed description of the operation and objectives of the SMMS project, which was initiated during the Asia-Pacific Multilateral Cooperation in Space Technology and Applications Conference series. In that connection, a memorandum of understanding on cooperation in the SMMS project was signed on 22 April 1998 in Bangkok by China, Iran (Islamic Republic of), Mongolia, Pakistan, the Republic of Korea and Thailand. The Government of China was also welcoming further bilateral and multilateral cooperation with other States, with special emphasis on small satellite development, to share the benefits of such technology for sustainable development.

36. The Chief Executive Officer of Surrey Satellite Technology Ltd. (SSTL) described the small satellite projects developed by SSTL and the Surrey Space Centre in cooperation with other countries and the technology transfer achieved through them. SSTL was well known for its small satellite programmes, which offered developing countries the opportunity to build up a domestic capability for developing national satellite programmes within a relative short period of time and within a realistic cost range. He also discussed future programmes, including the development of a constellation of small satellites for disaster warning, monitoring and mitigation applications, as well as the possibility of lunar and interplanetary missions. The Surrey Space Club, a forum of emerging spacefaring States with experience in small satellite projects, was established with the aim of increasing international cooperation and eventually embarking on international joint small satellite projects.

37. A representative of Alcatel Space, described the light-weight Proteus satellite bus and its technical details. The bus could be adapted to a wide range of space missions. Fields of application included telecommunications, navigation, Earth Observation and science. With a payload capacity of 300 kilograms and a power capacity of 300 watts, the Proteus platform was designed to meet the requirements of space missions too large for small satellites (in the 100-kilogram range) and too small for large, full-scale satellites (in the above-1,000-kilogram range). Possibilities for cooperation and participation ranged from delivery of the standard service module to delivery of a complete satellite and in-flight reception of the complete system. The Proteus platform could also be used as a generic base for the development of dedicated satellite buses in the 300- to 1,000-kilogram range. The platform would be used for the JASON-1 satellite, an oceanography mission involving the cooperation of Alcatel, CNES and the NASA Jet Propulsion Laboratory, replacing the Topex-Poseidon satellite, and in the scientific COROT satellite, a mission for studying the inner structure of stars and for the detection of planets beyond the solar system.

D. Space technology for disaster management

38. Natural and human-made disasters created many problems in developing countries, which often lacked the infrastructure to react efficiently to such disasters. Each year, the result was an unacceptably high economic and human loss. Space technology, in the form of Earth Observation or telecommunication satellites, could alleviate many of those problems and help stabilize the situation in the aftermath of disasters more quickly. Certain space applications could also be used to introduce effective preventive measures and to implement a disaster early-warning capability to reduce the expected economic and human loss when disasters struck. The importance of addressing that topic became even more evident to the Workshop participants when it was announced that a space expert from Bangladesh, who was to give an invited presentation on space-assisted disaster management, was unable to attend the Workshop because of catastrophic floods then taking place in his country.

39. The application of telecommunications systems for disaster management was illustrated by a representative of Telstra, an Australian provider that had recently introduced a new telecommunications service. The new service was based on the International Mobile Satellite Organization (Inmarsat) mini-M system using a laptop mobile terminal. The system compared favourably with other global mobile personal communication systems in terms of its data rate and operational costs, and would be especially useful in situations where the terrestrial telecommunications infrastructure was unavailable or inoperative. Terminals based on earlier versions of that system had been successfully used in crisis situations all over the world.

40. In the second panel discussion on the theme "International and regional cooperation: small satellites and disaster warning projects", panelists stressed that critical factors for disaster monitoring and mitigation applications were not only spatial and spectral resolution, but also temporal resolution. For some types of disasters, for instance, floods, SAR systems had advantages over optical systems, such as all-weather imaging. However, SAR systems were still costly in terms of both acquiring and processing the image data when compared with optical systems. It was suggested that a gradual development from the use of optical data to data obtained by near-infrared sensors, and then to SAR data, might be a viable approach for emergency response offices with little or no remote sensing experience.

41. Disaster monitoring applications were a good means of convincing Governments of the benefits of space technology. For example, the Government of Indonesia had increased its support for remote sensing applications after the huge damages and economic losses caused by forest fires in 1997. A major effort was required to slowly acquaint the management responsible for mitigation actions with the new technology. The implementation of space technology in disaster management applications was often met with resistance, since management was not always ready to accept the new technology. Well-structured education and training programmes were therefore a precondition for introducing space technology.

42. For the development of a national satellite programme, an inventory of national technology and manpower resources should first be taken and long-term plans be made before starting such an activity. A long-term commitment was necessary for a national satellite technology programme to maintain momentum. Participants also discussed the idea of sharing the development, cost and benefits of a constellation of small satellites. A cost-benefit analysis would help to establish the cost of such a project and to better inform decision makers. Participants concluded that regional multilateral or bilateral cooperation in small satellite projects should be promoted and would provide a synergy resulting in greater benefits than the independent pursuit of development programmes in each country.

E. Satellite communications and applications: mobile systems and Very Small Aperture Terminals

43. In late 1998, the first operational telecommunication satellite constellations had been fully deployed. The IRIDIUM and Orbcomm satellite systems had entered into service. Several other projects were in the design or testing stage. The advantage of satellite constellations was their worldwide or near worldwide coverage regardless of the nature of the local telecommunications infrastructure. The IRIDIUM system could provide voice communication between any two points on the planet. Regulatory aspects were still the biggest hurdles for providing services in all countries.

44. While the current personal mobile satellite communication systems were designed to provide data rates sufficient for messaging services and voice data, future systems were designed to support broadband applications. The Skybridge system was a proposed constellation of approximately 80 satellites and would provide global access to interactive, multimedia communications starting in late 2001 to address the growing demand for high-speed data communications and broadband applications. The system would be integrated with existing terrestrial broadband networks and use satellite links only when they were essential to bring down the overall cost.

45. Very Small Aperture Terminal (VSAT) networks were providing a variety of services suitable for business communications in India. VSAT technology was an ideal solution to provide telecommunication services to users in developing countries, especially in rural areas with insufficiently developed telecommunications infrastructures or at remote sites of geographically dispersed organizations. In the later case, a central, larger hub station connected via the space segment to the various remote sites, which were equipped with small, simple and relatively cheap satellite antennas. Applications ranged from stock market and news broadcasting, distance education and training, pricing databases, audio broadcasting and relay advertising in one-way VSAT networks to interactive computer transactions, database enquiries, videoconferencing, bank and automated-teller-machine transactions, reservation systems, voice communications and e-mail in two-way VSAT networks. The Indian VSAT networks were based on the domestic Indian National Satellite series of satellites. Currently, there were four operational satellites providing telecommunications, broadcasting and meteorological services. In the not-too-distant future, Ka-band satellites would be able to provide connectivity with a data rate of up to 2 megabytes per second between ground stations equipped with antennae dishes having a diameter as small as 75 centimetres. VSATs had a major role to play in the concept of a global village.

F. Earth Observation applications

46. Remote sensing from space could provide essential information for policy-making, land use and land cover, environmental and agricultural applications and planning of resource utilization. When combined in GIS with data from other sources, for example, with socio-economic and population data, it could become an essential tool for the implementation of national and local development strategies. For such a system to be successfully applied in implementing programmes of major importance for the country, the following was necessary: to have the support of high-level policy and decision makers; to train a critical number of well-qualified specialists to supervise the system; to establish effective mechanisms to transfer the information extracted from the data to the application specialists and to train the latter in using the data to assist in practical decision-making; and finally, to ensure access to the information by the user community on a regular and timely basis.

47. The Royal Centre for Remote Sensing of Morocco was using GIS for the location and sustainable exploitation of resources. The use of GIS was dictated by the increasing constraints on the exploitation of resources and by the complexity of natural phenomena. The need for the identification of long-term trends in the evolution of natural resources and phenomena could best be tagged by GIS combining data from different sources that could capture interaction on different scales (global, regional and local). GIS for sustainable development made possible the integration of all components involved in resources management by using a systems approach aimed at the optimal use of resources. The availability and continuity of data, problems in data exchange standards, copyright issues and the lack of expertise were among the hurdles in implementing such GIS. They had to be overcome by improving education, training, technology transfer and access to data. Several professional organizations were promoting the use of GIS and working towards solving the known problems. However, users in developing countries were sometimes unaware of those organizations, or in many cases could not afford to subscribe to the relevant publications.

48. The National Space Development Agency of Japan (NASDA) was conducting a number of activities in the region of Asia and the Pacific. The activities consisted in education and training programmes, pilot projects, satellite data reception agreements, data utilization agreements, cooperative experiments and data network programmes. Within the Asia-Pacific Pilot Project, NASDA had been working with Indonesia and Thailand in the operational use of satellite data for rice field classification and acreage assessment and for pest disease detection and identification. For that purpose, ground receiving stations and processing facilities for the JERS-1 satellite and the Advanced Earth Observation Satellite had been established in those

countries. In addition, the Global Research Network System (GRNS) was designed to establish a human network and to develop standardized data sets for desertification, forest cover, hydrological management and the coastal environment. Participants in GRNS were Australia, China, Indonesia and Thailand.

49. Spatial information technologies of remote sensing, the Global Positioning System and GIS would facilitate the manipulation of environmental data to provide better or more appropriate information for decision-making and resource management than had previously been available. Experience showed that the success of any technology transfer programme depended on the provision of trained personnel. To sustain remote sensing applications, two forms of assistance were necessary, namely, financial and technical assistance. The financial commitment to the successful implementation of remote sensing had been limited in the past, lacking an overall strategy at the Government, industry or institution level. Few Governments had committed sufficient funds to allow remote sensing and GIS technologies to become fully operational, let alone sufficient money for the necessary training and personnel. It was therefore necessary that the developers of remote sensing technology and agencies committed to technology transfer should support and fund the establishment and maintenance of training programmes in remote sensing, until a sufficient number of potential users had adopted the technology and thereby created a demand for trained and capable personnel.

50. Local decision makers often chose not to use Earth Observation data because of the perceived high cost and the fact that in many cases information was not available in the local context. To find a solution to such problems, the National Aerospace Laboratory of the Netherlands had developed RAPIDS, a personal-computer-based local ground station for the reception of optical and radar data. Through the ground station, satellite data could be received directly and locally by the user organization in a relatively cheap and straightforward manner. It had been developed to operate automatically and to be managed without excessive technical support and with the ability to collect data for the principal area around the user (plus or minus 45 degrees elevation). The ground station was flexible enough to receive data from a range of satellites (European Remote Sensing Satellite (ERS-1 and ERS-2), Japanese Earth Resources Satellite (JERS) and Système pour l'observation de la Terre (SPOT 1-4) (French Earth observation satellite)), allowing for a multimission and multisensor approach. For ease of transportation, it had been designed to keep within the minimum physical size. The system would be further tested during the monsoon season (March-October) in Bangladesh in 1999 to deliver timely information on floods. It was anticipated that the more timely, cost-effective access to less expensive high-resolution data would lead to an explosive growth in the transfer and utilization of applications using remote sensing data. The focus needed to be on operational activities and the use of appropriate technology to sustain operational remote sensing. RAPIDS was an example of such an appropriate technology. It made it possible to obtain vast amounts of data in a regular and cost-effective manner. Further information on RAPIDS can be obtained from http://www.neonet.nl/rapids/.

51. Space Imaging would start to commercially distribute 1-metre panchromatic and 4-metre multispectral images in mid-1999. The data would be acquired by a new generation of remote sensing satellites, Ikonos-1 and Ikonos-2. The image resolution provided by those satellites would be the highest available in the civilian remote sensing data market. The short maximum revisiting time of three days would make possible new applications in infrastructure development, transportation, urban planning and development, environmental management and engineering, disaster assessment, management of natural resources and national and global security.

52. In the panel discussion on the theme "Matching developing country needs and commercial space applications", needs of the developing countries with regard to satellite communications and satellite remote sensing applications and the relevant commercialization aspects in both areas were discussed. While satellite communications were used on a personal level, remote sensing applications were mainly used by institutions or organizations and were not directly linked to personal needs. The broad base of users was one reason why satellite communications had developed into a strong market, while the remote sensing data market was still in a somewhat developmental stage, although slowly growing. To address that problem, the focus for remote sensing applications should be placed on the generation of value added information that was relevant to users on a personal level. Five factors were needed for the remote sensing data market to succeed, namely, affordability, accessibility, availability and timeliness of data, as well as user awareness.

53. Changes in the commercial remote sensing sector, such as the increasing number of data providers arising from the deregulation of image products after the end of

the cold war would also benefit users. The need for a balance between the interests of users who preferred to receive data free of charge and those of the commercial sector that had to work on a profit basis was also discussed. It remained a challenge to match the needs of developing countries and commercial data providers. However, there was the potential for both sides to benefit and to create a win-win situation, if data providers succeeded in demonstrating the cost-benefit advantage of using remote sensing data.

G. The way forward

54. With the launch of the first components of the International Space Station (ISS), there would soon be long-term research opportunities for researchers to operate their experiments under microgravity and space environment conditions on ISS. Various initiatives were already under way to commercialize ISS. One of the first private companies providing services for the resupply of ISS, as well as for providing equipment for a large variety of space experiments, was SpaceHab Inc. The company was selling space on its logistical carriers and pressurized payload modules, and also acting as a consultant for researchers to fly their experiments on ISS. Several institutions in developing countries, for example, universities in South America, were already participating in various experiments. The high cost of delivering payloads into space and in operating experiments on ISS were still major hurdles to overcome for both developed and developing countries in performing such experiments on a routine basis. However, reusable launch vehicles currently under development might one day help to considerably reduce the cost of space access. It was therefore important to inform institutions in developing countries about opportunities to engage in microgravity research, which, for example, could help to develop drugs for major illnesses that caused considerable economic and human losses in those countries.

55. A representative of BRAZSAT, a commercial space company in Brazil, discussed the issue of matching developing country needs and commercial space applications. BRAZSAT was a major player within the Brazilian space programme. Brazil did not intend to reinvent the wheel, and its space programmes were therefore designed to engage in active global cooperation. The success of the Brazilian space programme and efforts towards commercialization illustrated once more the importance of convincing policy and decision makers of the benefits of space technology applications.

Notes

[1] See *Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 9-21 August 1982* (A/CONF.101/10 and Corr.1 and 2), part one, sect. III.F, para. 430.

[2] *Official Records of the General Assembly, Fifty-second Session, Supplement No. 20* (A/52/20), para. 39.

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Report of the United Nations Expert on Space Applications

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I. Introduction

1. At its thirty-fifth session, held at Vienna from 9 to 20 February 1998, the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space reviewed the activities of the United Nations Programme on Space Applications. The Subcommittee noted that the 1997 activities of the Programme had been carried out satisfactorily, and that upon the recommendation of the Committee, the activities scheduled for 1998 had been endorsed by the General Assembly in its resolution 52/56 of 10 December 1997. The Subcommittee recommended to the Committee, for its approval, the activities scheduled for 1999 under the regular budget, and took note of other activities of the Programme, all of which were to be implemented as part of the space-applications-related recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82), as proposed by the Expert on Space Applications in his annual report (A/AC.105/693) submitted to the Scientific and Technical Subcommittee at its 1998 session. The present report reviews the steps taken to date to translate the mandate of the Programme into operational activities.

II. Mandate of the Programme

2. The General Assembly, in its resolution 37/90 of 10 December 1982, took into account the recommendations of UNISPACE 82 and expanded the mandate of the Programme to include, in particular, the following elements: (a) provision of assistance in the development of indigenous capability at the local level; (b) provision of long-term fellowships for in-depth training; (c) provision of technical advisory services to Member States and regional institutions upon request; (d) organization of regional and international training courses, seminars, workshops, conferences and technical expert meetings for the benefit of specialists, educators, managers and decision makers in order to enhance their technical capabilities and keep them abreast of ongoing developments in the discipline; (e) acquisition and dissemination of space-related information; and (f) promotion of greater cooperation between developed and developing countries, as well as among developing countries. Presented below are summaries of the activities carried out within the mandate of the Programme in 1998 and those scheduled for implementation in 1999. The activities to be organized in the year 2000 will be predicated on UNISPACE III recommendations.

3. In paragraph 23 of its resolution 52/56 of 10 December 1997, the General Assembly agreed that the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) should be convened at the United Nations Office at Vienna from 19 to 30 July 1999 as a special session of the Committee, open to all Member States of the United Nations. In its report on the work of its fortieth session, the Committee agreed that, as part of its programme of regular activities for 1998 and 1999, the Programme should organize regional preparatory conferences for UNISPACE III.[1] The organization of the special preparatory conferences was carried out in consultation with Member States in each region. The programme of each of the preparatory conferences also reflected the elements of the annotated agenda of UNISPACE III.

A. Regional preparatory conferences for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space

4. From June 1997 through May 1998, the Office for Outer Space Affairs consulted with Member States on the hosting of the UNISPACE III regional preparatory conferences. On the basis of those consultations as well as those among Member States themselves, Malaysia, Chile and Morocco hosted the regional preparatory conferences for, respectively, Asia and the Pacific (Kuala Lumpur, 18-22 May 1998), Latin America and the Caribbean (Concepción, Chile, 12-16 October 1998) and Africa and the Middle East (Rabat, 26-30 October 1998). The preparatory conferences were issues-oriented and took into consideration the objectives of UNISPACE III, focusing on: (a) enhancing the understanding of Member States of the role and use of space technology in social and economic development; (b) issues associated with implementing space technology and applications programmes; and (c) improving and facilitating regional and international collaboration. Some key elements of the recommendations of the conferences are highlighted in annex I. The regional preparatory conference for UNISPACE III for eastern Europe will be held in Bucharest from 25 to 29 January 1999. The observations and recommendations of the regional preparatory conference for eastern Europe will be issued as an addendum to the present report.

5. Full reports on each of the regional preparatory conferences are contained in documents A/CONF.184/PC/2-5. A compilation of the recommendations of the conferences is contained in document A/CONF.184/PC/L.5 and Add.1.

B. Development of indigenous capability

6. The efforts of the Programme in developing indigenous capability at the local level has focused, in large part, on human resources development. In that connection, the General Assembly, in its resolution 45/72 of 11 December 1990, endorsed the recommendation of the Working Group of the Whole of the Scientific and Technical Subcommittee, as approved by the Committee, that:

> "... the United Nations should lead, with the active support of its specialized agencies and other international organizations, an international effort to establish regional centres for space science and technology education in existing national/regional educational institutions in the developing countries" (A/AC.105/456, annex II, para. 4 (n)).

7. The Programme continues to work with Member States at the regional level to establish the Centres. Details of those efforts are contained in paragraphs 8 to 14 below. The General Assembly, in its resolution 50/27 of 6 December 1995, also endorsed the recommendation of the Committee that "these centres be established on the basis of affiliation to the United Nations as early as possible and that such affiliation would provide the centres with the necessary recognition and would strengthen the possibilities of attracting donors and of establishing academic relationships with national and international space-related institutions".

1. Regional centres for space science and technology education

(a) Africa

8. The regional Centre for Space Science and Technology—in French Language was inaugurated on 24 October 1998 in Casablanca, Morocco. At its first meeting, on 24 October 1998, the Governing Board of the Centre appointed its first Director, Abderrahmani Touzani. The first programme of the Centre will be a two- to three-day seminar, to be attended by most senior administrative and scientific representatives of each of the participating countries, in an attempt to mobilize support for the activities of the Centre in each of the countries concerned.

9. The Regional Centre for Space Science and Technology Education—in English Language was inaugurated on 24 November 1998. At its first meeting, on 24 November 1998, the Governing Board appointed E. E. Balogun as Acting Director of the Centre. A document on the proposed activities of the Centre, which had been developed for implementation in March 1999, as well as other matters relating to the Centre, will be reviewed at the resumed session of the Board in 1999. The document contains proposals for: (a) a workshop on the role of space science and technology in national economic development; (b) a nine-month course on remote sensing and geographic information systems (GIS); and (c) the research orientation of the Centre.

(b) Asia and the Pacific

10. Since its inauguration in India on 1 November 1995, the regional Centre for Space Science and Technology Education in Asia and the Pacific has successfully conducted three courses on remote sensing and GIS and a course on each of the following topics: satellite communications; satellite meteorology and global climate; and basic space science. Upon completion of their nine-month course in each activity, the candidates have carried out a one-year applications project in their home countries.

11. The Programme works closely with the governing boards of the centres on each of their activities.

(c) Latin America and the Caribbean

12. The official inauguration of the regional Centre for Space Science and Technology Education in Latin America and the Caribbean is expected to occur by March 1999. In preparation for the opening of the campus of the Centre in Brazil, the Instituto Nacional de Pesquisas Espaciais (INPE) (Brazilian National Institute for Space Research) has carried out a number of activities for the benefit of States in the region, as follows:

Title of seminar/ training course	*Date*	*Place*	*Number of participants*
Seminar on Space Law	Three days in December 1997	São José dos Campos, Brazil	18
Seminar of the Southern Cone Common Market (MERCOSUR) on Technological Advances of Space Activities for Decision Makers	20-22 May 1998	Montevideo, Uruguay	106 (from six countries in the region and two countries in other regions)
Training Course on Meteorological Satellite Applications	21-25 September 1998	São José dos Campos, Brazil	14 (from two countries)
Twelfth Course in Remote Sensing	11 May to 7 December 1999	INPE facilities	Unspecified number from six countries

(d) Western Asia

13. An evaluation mission to Jordan and the Syrian Arab Republic was conducted from 24 June to 1 July 1998. The reports of the mission are currently being finalized in consultation with the Governments of Jordan and the Syrian Arab Republic, with a view to selecting a host country for a regional centre in western Asia.

(e) Network of space science and technology education and research institutions for States of central, eastern and south-eastern Europe

14. A technical study mission to Bulgaria, Greece, Hungary, Poland, Romania, Slovakia and Turkey was conducted from 24 November to 7 December 1998. The objective of the mission was to undertake a technical study and provide an accurate and informative report that could be used in determining, in each country visited, an agreed framework for the operation of a network of space science and technology education and research institutions.

C. Long-term fellowship programmes for in-depth training

15. The Programme received seven long-term fellowship offers for the period 1998-1999: five of these were from the European Space Agency (ESA) and two from the Government of China. The status of the awards for the period is reflected in annex II of the present report. The fellowship awards cover monthly allowances for room and board and other related expenses. The focus of the fellowship activities offered are described below.

16. The five ESA long-term fellowships are each for a period of one year of research and study at ESA institutions in the following disciplines:

(a) One fellowship for Space Antennas and Electromagnetism;

(b) Two fellowships for Remote Sensing Information Systems, tenable at the European Space Research Institute (ESRIN) in Frascati, Italy;

(c) One fellowship for Remote Sensing Instrumentation, tenable at ESTEC in Noordwijk, Netherlands;

(d) One fellowship in Communications Systems, tenable at ESTEC in Noordwijk.

17. The above-mentioned ESA fellowship awards were advertised in December 1997. Selected candidates will begin their studies at the specified ESA institutions in January 1999.

18. The two fellowship awards from China are each for a period of one year of research and study in geodesy,

photogrammetry and remote sensing research at the Wuhan Technical University of Surveying and Mapping in Wuhan, China.

19. The fellowship programme initiated by the Programme in 1985 in Brazil at INPE has fully matured through its financial co-sponsorship by the United Nations University; its operation is now being managed by the two institutions.

D. Technical advisory services and promotion of regional cooperation

20. Various technical advisory services currently being provided under the auspices of the Programme are described below.

1. Cooperative information network linking scientists, educators, professionals and decision makers in Africa

21. Following the endorsement by the Governing Board of the cooperative information network linking scientists, educators, professionals and decision makers in Africa (COPINE), in Helsinki in July 1997, of the three-part COPINE project document, the Governing Board addressed the future of the project at its meeting held in London on 27 April 1998, and arrived at the following conclusions and recommendations; (a) the African countries participating in the project should each develop its respective national implementation plan for the project based on guidelines consisting of 18 points drawn up by the African countries and the Governing Board; (b) the Governing Board would request the Office for Outer Space Affairs of the Secretariat to take responsibility for ensuring that the national implementation plans are developed on schedule, that is, before the end of September 1998; (c) a practical demonstration of the COPINE project would be undertaken, before the end of 1998, among a selected number of African countries; and (d) the Office should work with the United Kingdom of Great Britain and Northern Ireland in planning the demonstration. The Board emphasized that until the implementation plans were developed by the African countries, it would be difficult for donor countries to determine their level of commitment to the project. The Programme has taken the necessary action on those issues, including a request for additional information from the participating African countries. In addition to the efforts of the Governing Board, the Office is also continuing to seek funding support for the COPINE project.

2. Follow-up activities to the United Nations/European Space Agency basic space science workshop series

22. As reflected in the report of the Expert on Space Applications submitted to the Scientific and Technical Subcommittee at its 1998 session (A/AC.105/693 and Corr.1 and Add.1, annex IV), a number of follow-up programmes and projects have resulted from the series of basic space science workshops that were organized, from 1991 to 1997 under the auspices of the Programme with the cooperation of ESA. The support of the Governments of Japan and of the beneficiaries concerned, that is, Colombia, Egypt, Honduras and Sri Lanka, has facilitated the implementation of the follow-up projects. Basic space science establishments in Morocco, Paraguay, the Philippines, Romania and Viet Nam have expressed interest in undertaking similar activities. In continuing this series, a workshop that will address the feasibility of establishing a World Space Observatory is scheduled to take place in Mafraq, Jordan, in March 1999 (activity number 2 in annex IV to the present report).

3. Asia-Pacific Satellite Communications Council

23. The Asia-Pacific Satellite Communications Council (APSCC), established and inaugurated in Seoul in October 1994 with the support of the Programme, continues to make much progress within the region. Its 1996 conference placed special emphasis on the contribution of satellite technology to the global information infrastructure. The growing recognition of APSCC since its establishment has resulted in its broad international membership, which currently stands at 60 full members and 5 associate members. In addition to its participation in the International Telecommunication Union (ITU) World Radiocommunication Conference of 1997, it also contributed, at that Conference, to the deliberations on the modification of the multilateral coordination approach, with emphasis on gaining access to the unplanned C-, Ku- and Ka-bands. In October 1998, APSCC put forward an initiative for an Asia-Pacific Regional Satellite Organization. The latter is perceived as being comparable to the Arab Satellite Communications Organization (ARABSAT) and the European Telecommunications Satellite Organization (EUTELSAT), and has been conceived as a vehicle for the contribution of the region of Asia and the Pacific to the development of satellite communications.

4. Follow-up to the United Nations/Sweden course for educators

24. A workshop to evaluate the impact of the United Nations/Sweden series of courses on remote sensing education for educators, held annually in Sweden since 1990, except in 1991, and to determine the future direction of the course, was held at Gaborone, Botswana, from 18 to 21 October 1998. The following major problems were identified: (a) insufficient access to satellite imagery for teaching and research purposes; (b) insufficient networking, cooperation and collaboration; (c) lack of reliable and efficient access to information on remote sensing development; (d) lack of political support; (e) limited access to information on training opportunities to address problems of insufficient skilled manpower; and (f) insufficient access to information on the development of appropriate curricula for remote sensing and GIS.

25. In view of the many local obstacles noted by educators in remote sensing in Africa and the corresponding loss of opportunity for developing national understanding and the use of a technology that has a significant impact on social and economic development, the Programme has proposed the implementation of a high-level programme of awareness on a country-by-country basis. As currently envisaged, representatives of the Office and the Swedish International Development Cooperation Agency (SIDA) will visit selected countries in Africa and meet with high-ranking government and university officials to discuss ways in which many of the local obstacles could be overcome in order to reap the benefits of the training received during the United Nations/Sweden course series. The proposal will be discussed with SIDA in 1999.

26. Proposals made during each workshop panel discussion were compiled into a single list and workshop participants were required to grade the importance of each proposal and its relevance to alleviating conditions within their particular local settings. That subsequently allowed ready identification of a limited number of priority proposals which, for the majority of participants, would be the most useful in furthering the local development of remote sensing education. The proposals were classified into three categories. Implementation of the proposals within the first category requires coordinated action by graduates of the United Nations/Sweden training course, acting as a group. The second category of proposals includes those requiring action by national and international entities. The third category concerns actions that principally involve the responsibility of individuals, acting more or less independently.

5. Follow-up activities to the United Nations/European Space Agency-sponsored training courses

27. Further to the technical assistance programme reflected in the report of the Expert on Space Applications submitted in 1998 (A/AC.105/693 and Corr.1 and Add.1, paras. 24-26), project proposals endorsed by their respective institutions and agencies were submitted for funding by participants in the four training courses (1993 to 1995 and 1997) held at the facilities of ESRIN. Those proposals were subsequently evaluated by a joint United Nations/ESA review panel in July 1998.

28. On the whole, after a detailed, two-stage review conducted by the joint panel, three proposals were selected for implementation and subsequent funding from the $150,000 available through the United Nations Trust Fund for New and Renewable Sources of Energy. The selected proposals are as follows:

(a) Project proposal submitted by the Asociación Boliviana de Teledetección para el Medio Ambiante (ABTEMA) on the use of C-band synthetic aperture radar (SAR) and optical data to monitor glaciers and snow cover for optimization of water supply predictive models and to study climatic changes and natural hazards. The project is to be carried out by ABTEMA in cooperation with the Universidad Nacional of San Juan (Argentina), the Pontificia Universidad Católica of Chile, the Universidad de Chile and the Ministry for Public Works, Dirección General de Aguas, of Chile;

(b) Project proposal submitted by the Regional Centre for Training and Applications in Agrometeorology and Operational Hydrology (AGRHYMET), to be carried out in cooperation with the Direction de l'Inventaire des Resources Hydrauliques of Burkina Faso, for the development of an information system for determining, monitoring and assessing flood areas and the establishment of an inventory of water resources in the Nakambé river basin of Burkina Faso;

(c) Project proposal submitted by the Remote Sensing Center of Viet Nam for the application of remote sensing technology in coastal management in Viet Nam.

29. The three proposals are being revised to incorporate the recommendations made by the joint review panel, thus making them fully qualified to obtain grants under the technical assistance programme from the Trust Fund.

6. Twelfth plenary meeting of the Committee on Earth Observation Satellites

(a) Partnership through the Integrated Global Observing Strategy

30. In 1996, the Committee on Earth Observation Satellites (CEOS) concluded that an Integrated Global Observing Strategy (IGOS) was needed to ensure coordination and cooperation in Earth Observation programmes. IGOS should integrate joint planning for cost-effective space and *in situ* systems, intercalibration, compatibility of data delivery systems and better links between data users and providers.

31. CEOS members are currently participating in an IGOS mechanism that will provide members with a prioritized set of observational requirements, for both research and operational applications, as inputs to programme planning. The IGOS Strategic Implementation Team continues to stress that IGOS should be incrementally implemented through carefully targeted project activities. Support for current IGOS projects has reflected individual agency interests as projects have variously fulfilled the needs of CEOS members.

32. The Office for Outer Space Affairs participated in the 1996 CEOS meeting, held in Seattle, Washington, United States of America, that led to the development of the IGOS initiative.

33. At the twelfth CEOS plenary meeting held in Bangalore, India, from 10 to 12 December 1998, IGOS was transformed into an independent partnership open to all members of CEOS and others with programmes and projects that are in conformity with IGOS objectives. The Office should participate in the IGOS Partnership through the contribution of its network of space science and technology education centres that are being established, on a regional basis, around the world. Through those centres, the Office will bring to the IGOS partnership a greater participation by developing countries, contributing in particular to the successful implementation of programmes proposed by other IGOS partners. The Office was invited to join a task force, chaired by the Food and Agriculture Organization of the United Nations, that will plan and coordinate the programme of presentations, draft statements and organization of the one day workshop on IGOS during UNISPACE III.

(b) Spectrum allocation

34. At its eleventh plenary meeting, held in 1997 in Toulouse, France, CEOS requested its Ad Hoc Group of Experts on Spectrum Management to contact ITU concerning relevant preparations for the 1999 World Radiocommunication Conference. At its twelfth plenary meeting, CEOS called on all its member agencies and associates to urge their respective administrations to consider making proposals to the 1999 Conference and future world radiocommunication conferences in respect of frequency allocations that are critical for Earth Observation. The relevant spectra include the following: 420-480 megahertz (MHz), useful to observe tropical storms; 4.20-4.40 gigahertz (GHz), useful for observing sea surface temperature through clouds; 5,150-5,260 MHz and 5,460-5,580 MHz, useful for spaceborne radiometry and SAR observation; 18.6-18.8 GHz, very useful in obtaining worldwide critical environmental measurements; and beyond 71 GHz, covering a series of spectral bands that are very useful for the acquisition of data essential to studies of climate and changes in the Earth environment.

(c) Committee on Earth Observation Satellites and the private sector

35. CEOS has for some time recognized the evolution of the commercial aspect of Earth Observation, and concluded in 1997 that a way should be found to engage the private sector in CEOS activities. At its twelfth plenary meeting, CEOS agreed that a mechanism must be established, under the control of the CEOS secretariat, to provide a more effective interface with the private sector. In that connection, CEOS agreed to organize the following: meetings for an exchange of views and information on specific topics between a CEOS subgroup and commercial companies interested in a particular topic; and dedicated workshops that would bring together CEOS members and companies in the private sector. The International Society for Photogrammetry and Remote Sensing (ISPRS), an associate of CEOS, was mandated by CEOS to assume that responsibility. The Office will collaborate with ISPRS in that endeavour.

E. Training courses, workshops, conferences and symposia organized by the United Nations

1. Activities carried out in 1998

36. In 1998, in addition to the mandated regional preparatory conferences for UNISPACE III (see paras. 4 and 5 above and annex I), four workshops, one training course, one conference and one symposium were conducted under the auspices of the Programme. A summary

of each of those activities is given in annex III to the present report.

2. Activities scheduled for implementation in 1999

37. The training courses, workshops, conferences and symposia scheduled for 1999 are shown in annex IV.

3. Activities proposed for implementation in 2000

38. The activities to be organized, under the auspices of the Programme, in the year 2000, will be predicated on UNISPACE III recommendations.

F. Space information

39. The ninth in the series of selected papers from the activities of the Programme, entitled *Seminars of the United Nations Programme on Space Applications* (A/AC.105/711), has been issued. The third edition of the directory entitled *Education, Training, Research and Fellowship Opportunities in Space Science and Technology and its Applications* (A/AC.105/671) has also been issued. Information contained in the directory is also available through the home page of the Programme on the Internet.

40. Information for Member States and the general public on the latest developments in the activities carried out by the Programme can be found on the home page of the Programme established on the Internet as part of the home page of the Office for Outer Space Affairs. This home page is accessible through the World Wide Web using the address http://www.un.or.at/OOSA/sapiax.html, and it contains information on activities that have been implemented as well as reports and press releases issued within the framework of the Programme. The schedules, objectives and programmes of planned activities and projects are also included in the home page.

III. Voluntary contributions

41. The successful implementation of the activities of the Programme in 1998 benefited from the support and voluntary contributions of Member States of the United Nations and their institutions, as well as from the assistance and cooperation of regional and other international governmental and non-governmental organizations. In 1998, the Programme received voluntary contributions, both in money and in kind, including the sponsorship of technical and scientific presentations by several experts, as described below.

42. A number of Member States (Australia, Austria, Botswana, Chile, India, Malaysia, Morocco, Nigeria, Spain and Sweden), governmental and non-governmental organizations (World Meteorological Organization, Austrian Space Agency, Centre National d'Études Spatiales (CNES) (French National Centre for Space Studies), ESA, European Commission, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), Instituto Nacional de Técnica Aeroespacial (Spanish Mission Control Centre), Federal Laboratory Consortium (United States of America), International Astronautical Federation, ISPRS, National Aeronautics and Space Administration of the United States, SIDA and the Swedish Space Corporation (SSC Satellitbild)) and other corporations and institutions (Lockheed Martin Corporation (United States), Spectrum Astro, Inc. (United States) and Stockholm University) provided support for the activities of the Programme in 1998 in various ways, including the following:

(a) Defraying the local expenses of candidates from developing countries in the long-term fellowship programmes (see annex II);

(b) Voluntary cash contributions of $25,000 received from the Government of Austria as well as from Spectrum Astro, Inc., $5,000 from Lockheed Martin Corporation, $3,200 from EUMETSAT and $2,500 from the Federal Laboratory Consortium, in support of the activities of the Programme;

(c) A financial contribution of $125,000 received from ESA in support of specific 1998 activities of the Programme as reflected in annex III;

(d) Co-sponsorship of the activities of the Programme and, in particular, defrayal of the costs of international air travel of participants, local organization and facilities, room and board, and local transportation (see annex III);

(e) Sponsorship (travel and daily subsistence allowance) of experts from Member States to make technical presentations and take part in deliberations on the activities of the Programme (see annex III).

IV. Financial provisions and administration of activities during the biennium 1998-1999

43. The activities of the Programme in 1999 covered in the present report will be implemented as follows:

(a) *Financial provisions.* Under the United Nations regular budget, a sum of $434,100 was approved in the programme budget by the General Assembly, at its fifty-second session, for implementing the activities of the Programme during the biennium 1998-1999. A balance of $217,000 from this budget will be used to implement the 1999 activities of the Programme. In order to effectively carry out its mandated and expanded activities, it has become necessary for the Programme to solicit additional funds, in the form of voluntary contributions, in support of its activities. Those contributions will be used to supplement the regular budget of the Programme;

(b) *Administration by and contributions and participation of staff.* The Office for Outer Space Affairs, and in particular the Expert on Space Applications and his staff, will carry out the activities described in the present report. In that connection, travel will be undertaken as appropriate by the Expert and his staff under the provisions of the travel budget of the Office for the biennium and as may be necessary from voluntary contributions.

Notes

[1] *Official Records of the General Assembly, Fifty-second Session, Supplement No. 20* (A/52/20, para. 153).

Annex I

Summary of the regional preparatory conferences for UNISPACE III held in 1998

Title, location and date	*Sponsoring country/ organization (host institute)*	*(a) Funding and nature of support* *(b) Number of participating countries and organizations* *(c) Total number of participants*	*Outcome of activity*
Regional Preparatory Conference for UNISPACE III for Asia and the Pacific Kuala Lumpur, 18-22 May 1998	Government of Malaysia, United Nations and ESA (Space Science and Studies Division, Ministry of Science, Technology and the Environment)	(a) Air travel and subsistence for 16 participants (United Nations and ESA); room and board for 7 participants and conference facilities (Government of Malaysia) (b) 28 countries and organizations (c) 64 participants	The conference, by consensus, arrived at a number of recommendations, including the following, which recognized the need for States in Asia and the Pacific: (a) to network the educational facilities in the region in order to impact education and training in the various disciplines of space technology at post-graduate level; (b) to increase the awareness of policy and decision makers of the potential of space remote sensing and related technologies, particularly in prediction, warning and mitigation of natural disasters such as earthquakes, floods, droughts and tropical cyclones; (c) to take advantage of the opportunities for regional collaboration provided through the implementation of joint projects such as satellite-based disaster monitoring, management and mitigation, particularly for the benefit of the States of the region, including the Pacific island States; (d) to share space as well as ground-segment capabilities to the extent possible with their counterparts; (e) to coordinate and harmonize the many ground-receiving-station operators of the Earth Observation satellite in the region of Asia and the Pacific, particularly in relation to the advent of hyperband observing systems, in order to develop a unified approach in the acquisition, processing and handling of remote sensing data using a standard format; and (f) to implement a regional collaborative project involving small satellites, based on a common payload, thus enabling a number of participating countries in the region to develop their human resources in the discipline and enabling the project to serve also as a technology demonstrator and a catalyst. (Detailed report contained in document A/CONF.184/PC/2.)

Title, location and date	*Sponsoring country/ organization (host institute)*	*(a) Funding and nature of support (b) Number of participating countries and organizations (c) Total number of participants*	*Outcome of activity*
Regional preparatory conference for UNISPACE III for Latin America and the Caribbean Concepción, Chile, 12-16 October 1998	Government of Chile , United Nations and ESA (Ministry of Foreign Affairs, University of Concepcion, Intendencia de la Región del Biobio)	(a) Air travel and subsistence for 18 participants (United Nations and ESA); air travel and subsistence for 10 participants and hosting facilities (Chile) (b) 33 countries and organizations (c) 170 participants	A selected number of recommendations addressed to States in the region and prepared by the two working groups established at the conference are presented below. The conference agreed to forward the entire set of recommendations to the Group of Latin America and Caribbean States at Vienna for their further consideration and refinement, with a view to concluding them in time for the next session of the Advisory Committee in February 1999. The aims of the selected recommendations include the following: (a) to promote the establishment of national focal points, such as national space agencies or commissions, through which all sectors of civil society concerned with such matters might participate; (b) to foster an active process of regional cooperation through, for example, the establishment of a permanent mechanism for coordination among agencies and other space institutions in the region, as well as harmonization of legislative matters related to cooperation in space affairs; (c) to expand the capacities of the countries of the region through education in space sciences as applied to environmental management, starting from the primary school level, while promoting opportunities for training and research and development for professionals in remote areas; (d) to promote the interlinking and effective cooperation of advisory (research) technical agencies with the operational agencies responsible for dealing with emergencies, through the use of telecommunications; (e) to encourage the use of remote sensing to protect the environment and ecosystems such as nature reserves, forests and coastal areas with a view to reducing the incidence of natural, chemical and socio-organizational disasters; and (f) to promote the declaration of an international decade aimed at the formulation of an integrated strategy for the use of space technology (2000-2010) for risk evaluation and disaster prevention, mitigation and relief. (Detailed report contained in document A/CONF.184/PC/3.)

Title, location and date	*Sponsoring country/ organization (host institute)*	*(a) Funding and nature of support (b) Number of participating countries and organizations (c) Total number of participants*	*Outcome of activity*
Regional preparatory conference for UNISPACE III for Africa and the Middle East Rabat, 26-30 October 1998	Government of Morocco, United Nations, ESA (Centre Royal de Télédétection Spatiale)	(a) Air travel (United Nations); room and board for 16 participants (Morocco) (b) 28 countries (c) 221 participants	The recommendations agreed to, by consensus, at the conference, include the following: (a) States in the two regions are encouraged to fully support and actively participate in the African regional centres for space science and technology education that have been established, under the auspices of the United Nations, in Morocco and Nigeria, and to be established in western Asia, with a view to building indigenous capabilities in space science and technology in each country and within the regions as a whole; (b) African States, the United Nations and the international community should fully support the development of an inter-African connection for telephony, data, tele-education, telemedicine, and the Internet, particularly through the realization of the COPINE project, an initiative of the Office for Outer Space Affairs. COPINE aims at solving the problems caused by the insufficient exchange of information in rural development, health care and education, management of natural resources and the environment, agricultural research and development and science and technology; (c) The States concerned should invest, through regional collaboration, in the development of necessary knowledge and skills of their citizens in different aspects of space science and technology, particularly through their participation in the development, design and fabrication of small satellites, with a view to gaining an understanding of the technology and the subsequent use of such small satellites for various socio-economic applications; (d) in order to maximize the beneficial impact of the numerous projects that are funded by donors and international organizations, including United Nations agencies, it is critical that the concerned donors and organizations and the countries that benefit from such projects coordinate and harmonize them; (e) The United Nations should establish, as a matter of urgency, a special fund of the Office to assist in the implementation of the recommendations of UNISPACE III; and (f) An African leadership conference at the level of either head of State or minister should be organized by the Office, with a view to increasing the level of awareness of space technology development and its impact on social and economic development. (Detailed report contained in document A/CONF.184/PC/4.)

Annex II

Long-range fellowships offered by the European Space Agency within the framework of the United Nations Programme on space applications, 1998-1999

Period	*Country or organization*	*Subject*	*Financial support by host country or organization*	*Fellowships offered*	*Candidates selected*	*Applications submitted*	*User countries (one or more candidates)*
1998/1999	ESA	Space antennas and electromagnetism	Subsistence allowance	1	1	13	Azerbaijan
1998/1999	ESA	Remote sensing information systems	Subsistence allowance	2	2	40	Azerbaijan, Viet Nam
1998/1999	ESA	Remote sensing instrumentation	Subsistence allowance	1	1	10	Republic of Korea
1998/1999	ESA	Communications systems	Subsistence allowance	1	1	37	Mongolia
1998/1999	China	Geodesy, photogrammetry and remote sensing	Subsistence allowance	2	1	1	Viet Nam

Annex III

Summary of United Nations training courses, workshops, conferences and symposia held in 1998

Title, location and date	*Sponsoring country/ organization (host institute)*	*(a) Funding and nature of support (b) Number of participating countries and organizations (c) Total number of participants*	*Outcome of activity*
Workshop on Emerging Trends in Satellite Meteorology Ahmedabad, India 9-12 March 1998	Government of India, United Nations and ESA (Regional Centre for Space Science and Technology Education in Asia and the Pacific, Indian Space Research Organisation (ISRO))	(a) United Nations provided $8,800 for the travel of some participants (b) 12 countries (c) 75 participants	The workshop was held in memory of Verner Suomi, to commemorate his great achievements in modern science, including his invention of many simple, elegant and widely used meteorological devices. The lecturers at the workshop were key professionals and experts in the field of satellite meteorology from different parts of the world. The focus of the workshop was the emerging trends in satellite meteorology, with special emphasis on technology and applications. The presentations on the whole were grouped under the following categories: satellites for short-, medium- and long-term timescales; applications and retrieval; Earth Observation-emerging scenario; media and education; satellite measurements of rainfall; and meteorological observations and climate change.
Second United Nations International Conference on Spin-off Benefits of Space Technology Tampa, Florida, United States 30 March-3 April 1998	United Nations, Spectrum Astro, Inc., ISPRS, Lockheed Martin Corporation, Federal Laboratory Consortium (United States)	(a) Air travel for 10 participants (United Nations); room and board for 10 participants (Spectrum Astro, Lockheed Martin, Federal Laboratory Consortium) (b) 17 countries and international organizations (c) 55 participants	Aspects of spin-off benefits explored included: technology transfer; communication and information technologies; commercial remote sensing; legal, financial and cooperative aspects of commercial partnership; challenges for developing countries, particularly in the areas of emerging markets. Other spin-off opportunities addressed were in health, education and energy development, disaster prevention and mitigation and the use of satellite data in support of fisheries operations. Participants also discussed concerns about the marketing of technologies in developing countries and how such technologies could be made available and effectively utilized in those countries. (Detailed report contained in document A/AC.105/706.)

Title, location and date	*Sponsoring country/ organization (host institute)*	*(a) Funding and nature of support (b) Number of participating countries and organizations (c) Total number of participants*	*Outcome of activity*
Eighth United Nations/Sweden International Training Course on Remote Sensing Education for Educators Stockholm and Kiruna, Sweden 4 May-12 June 1998	Government of Sweden and United Nations (Stockholm University, SSC Satellitbild)	(a) Air travel and expenses en route (United Nations); all other expenses including room and board and local travel (b) 18 countries (c) 24 participants	The following recommendations made by the participants were aimed at improving the Course to make it more responsive to evolving needs in their countries and academic institutions: (a) the parts of the Course dealing with visual image interpretation and remote sensing curricula should be shortened; (b) the parts of the Course dealing with digital image processing, GIS, radar and cost-benefit analysis should be expanded; (c) the availability of satellite images of their home countries requested by participants for use during the Training Course should be improved; and (d) the amount of free time allowed to participants to review the copious volume of technical material presented during lectures should be increased. The Office for Outer Space Affairs, Stockholm University and SIDA are currently reviewing the above recommendations, including the feasibility of holding a more advanced course for educators in remote sensing. (Detailed report contained in document A/AC.105/704.)
United Nations/European Space Agency Symposium on Economic Benefits of Using Space Technology Applications in Developing Countries Graz, Austria 7-10 September 1998	Government of Austria, United Nations, ESA, European Commission (State of Styria, City of Graz)	(a) Air travel and subsistence allowance for 30 participants and other expenses (b) 42 countries (c) 100 participants	The United Nations/ESA Symposium is now fairly well established as an annual event for discussing the use of space technology applications in developing countries. The discussions and the exchange of first-hand experiences and opinions resulted in a set of guidelines on how to most efficiently introduce the broad range of space benefits to developing countries. Furthermore, the Symposium will be used as a starting point for a number of projects initiated by participants in the meeting (for example, a remote sensing workshop in Bolivia based on the outcome of the Graz meeting). (Detailed report contained in document A/AC.105/712.)

Title, location and date	*Sponsoring country/ organization (host institute)*	*(a) Funding and nature of support (b) Number of participating countries and organizations (c) Total number of participants*	*Outcome of activity*
First United Nations Workshop on the International Search and Rescue Satellite System (COSPAS-SARSAT) for African search and rescue points of contact (SPOCS) and the Spanish Mission Control Centre Maspalomas, Canary Islands, Spain 24-25 September 1998	Government of Spain, United Nations, ESA Instituto Nacional de Técnica Aeroespacial (INTA) Centro Nacional Espacial de Canarias, Maspalomas)	(a) Air travel for 11 persons (United Nations); room and board (INTA) (b) 9 countries (c) 20 participants	The Workshop was organized to provide those countries that are within the range of the COSPAS-SARSAT station in Maspalomas to gain the necessary knowledge to enable them to participate in the COSPAS-SARSAT programme. To accomplish that objective, the programme of the Workshop focused on the following: (a) the use of maritime, aeronautical and personal locator beacons (PLBs); (b) the use of PLBs in areas and places isolated from populated settlements; (c) the importance of creating a national register for radio beacons; (d) the regulations needed to use the COSPAS-SARSAT system; (e) the establishment and identification of a national point of contact—SPOC; (f) the interpretation of alert messages; and (g) the elimination of possible interference in the frequencies reserved for the COSPAS-SARSAT system. (Detailed report contained in document A/AC.105/713.)
United Nations/ International Astronautical Federation (IAF) Workshop on Expanding the User Community of Space Technology in Developing Countries Melbourne, Australia 24-27 September 1998	Government of Australia, United Nations, CNES, IAF (Cooperative Research Centre for Satellite Systems)	(a) Air travel, subsistence allowance and facilities, equipment (b) 29 countries and organizations (c) 100 participants	The United Nations and IAF conceived this Workshop series as a unique discussion forum for space experts, policy and decision makers and representatives from private industry. The Workshop is now fairly well established as an essential component of the IAF Congress. The current format, which encourages the participation of representatives from private industry, will be maintained. As has been the case in the past, contacts established between participants resulted in a number of initiatives and activities (for example, memoranda of understanding signed or planned to be signed between space agencies/government organizations in emerging spacefaring States and a well-known manufacturer of small satellites and microsatellites) that strengthened the role of space-technology applications in improving the quality of life in developing countries. (Detailed report contained in document A/AC.105/714.)

Title, location and date	*Sponsoring country/ organization (host institute)*	*(a) Funding and nature of support* *(b) Number of participating countries and organizations* *(c) Total number of participants*	*Outcome of activity*
Workshop on the Evaluation of the United Nations/ Swedish International Development Cooperation Agency International Training Course Series on Remote Sensing Education for Educators Gaborone, Botswana 18-21 October 1998	Government of Sweden, United Nations (SIDA, Stockholm University, Department of Physical Geography)	(a Air travel and daily subsistence allowance for: 5 participants (United Nations) 27 participants (Sweden) (b) 16 countries (c) 32 participants	The Course organizers, that is, Sweden and the United Nations, agreed to work with the participants, upon request, to assist them in securing recognition for, and the marketing of, their skills in their respective countries. Such an effort would require a partnership between the local government authorities, the institutions of the participants, the local office of the United Nations Development Programme, the participants and the Permanent Missions to the United Nations of the countries concerned. The Office for Outer Space Affairs will serve as the focal point for this effort. (Detailed report contained in A/AC.105/709.)

Annex IV

United Nations Programme on Space Applications: schedule of training courses, workshops, conferences and symposia in 1999

Activity number	*Activity*	*Date and place*	*Objective*
1	Regional preparatory conference for UNISPACE III for eastern Europe	25-29 January 1999 Bucharest, Romania	Regional preparatory meetings for UNISPACE III are being organized in consultation with Member States in each region. The programme of this preparatory meeting reflects the elements of the annotated agenda of UNISPACE III. The outcome of the meeting will serve as input into the UNISPACE III draft report.
2	United Nations/European Space Agency Workshop on Basic Space Science	13-17 March 1999 Mafraq, Jordan	This workshop will address the feasibility of establishing a World Space Observatory and a worldwide network of small astronomical telescopes.
3	American Institute of Aeronautics and Astronautics Workshop on International Space Cooperation: Solving Global Problems	11-15 April 1999 Bermuda	To focus on specific problems of global significance, including topics of special interest to developing countries. The results of this workshop will be presented at UNISPACE III in July 1999
4	Regional workshop (in French language) on the role of the regional Centre for Space Science and Technology—in French Language in national and regional development	Second or third quarter of 1999 Rabat, Morocco	To educate policy makers, planners, research and development agencies and appropriate entities within the private sector on the role of space science and technology in social and economic development and the contributions of the Centre to the achievement of such a goal.
5	Regional Workshop (in English language) on the role of the Regional Centre for Space Science and Technology Education—in English Language in National and Regional Development	Second or third quarter of 1999 Ile-Ife, Nigeria	To educate policy makers, planners, research and development agencies and appropriate entities within the private sector on the role of space science and technology in social and economic development and the contributions of the Centre to the achievement of such a goal.
6	Ninth United Nations/Sweden International Training Course on Remote Sensing Education for Educators	3 May-11 June 1999 Stockholm and Kiruna, Sweden	To develop the knowledge and skills of university educators in remote sensing technology and to equip the participants with the capability to introduce elements of the technology, as appropriate, in the academic curricula of their own universities and institutes.

Activity number	*Activity*	*Date and place*	*Objective*
7	United Nations/European Space Agency Seminar on Space Applications in Promoting Sustainable Agriculture	September 1999 Beijing, China	To educate the participants on new and emerging trends in remote sensing technology, with emphasis on the new generation of high-resolution sensor systems. The workshop will also address: (a) the evaluation of data observed by such systems, particularly for use in precision agriculture; and (b) the development of the necessary software for assessing and analysing related data.
8	Second United Nations Workshop on the International Search and Rescue Satellite System for African search and rescue points of contact and the Spanish Mission Control Centre	September 1999, Maspalomas, Canary Islands, Spain	To train the participants in the organization and establishment of the COSPAS-SARSAT network in each country and to assist them in the planning and design of the required local infrastructure for COSPAS-SARSAT programmes, including the development of curricula for the training of local manpower.
9	Post-UNISPACE III briefing at the Second Asia-Pacific Ministerial Conference on Space Applications for Sustainable Development[a]	2-8 December 1999 New Delhi, India	To brief States in the region of Asia and the Pacific on the outcome of UNISPACE III and to bring to their attention those elements (for example, recommendations) of the Conference that are specific to the region of Asia and the Pacific and to work with those States on the translation of such recommendations into action-oriented programmes.

[a]Similar briefings will be undertaken at appropriate ministerial conferences and meetings in the other regions (covered by the Economic Commission for Latin America and the Caribbean, the Economic Commission for Africa and the Economic and Social Commission for Western Asia).

United Nations A/AC.105/716

General Assembly

Distr.: General
28 January 1999

Original: English and French

Committee on the Peaceful
Uses of Outer Space

European Space Agency

Note by the Secretariat

The European Space Agency has submitted the attached annual report for the information of the members of the Committee on the Peaceful Uses of Outer Space.*

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* In view of the limited number of copies received, the report is being distributed to the members of the Committee only. The report is available only in the languages in which it was submitted (English and French).

V.99-80563 (E)

United Nations A/AC.105/717

General Assembly

Distr.: General
28 January 1999

Original: English

Committee on the Peaceful Uses of Outer Space

International Telecommunications Satellite Organization

Note by the Secretariat

The International Telecommunications Satellite Organization has submitted the attached annual report for the information of the members of the Committee on the Peaceful Uses of Outer Space.*

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* In view of the limited number of copies received, the report is being distributed to the members of the Committee only. The report is available only in the language in which it was submitted (English).

V.99-80569 (E)

United Nations A/AC.105/718

General Assembly

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28 January 1999

Original: English

Committee on the Peaceful
Uses of Outer Space

National Aeronautics and Space Administration

Note by the Secretariat

The National Aeronautics and Space Administration of the United States of America has submitted the attached annual report for the information of the members of the Committee on the Peaceful Uses of Outer Space.*

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* In view of the limited number of copies received, the report is being distributed to the members of the Committee only. The report is available only in the language in which it was submitted (English).

V.99-80575 (E)

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Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
Thirty-sixth session
Vienna, 22-26 February 1999

Report of the Scientific and Technical Subcommittee on the work of its thirty-sixth session

I. Introduction

1. The Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space held its thirty-sixth session at the United Nations Office at Vienna from 22 to 26 February 1999 under the chairmanship of Dietrich Rex (Germany).

2. Representatives of the following Member States attended the session: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Cuba, Czech Republic, Ecuador, Egypt, France, Germany, Greece, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Kenya, Lebanon, Mexico, Morocco, Netherlands, Nigeria, Philippines, Poland, Portugal, Republic of Korea, Romania, Russian Federation, South Africa, Spain, Sudan, Sweden, Syrian Arab Republic, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Venezuela and Viet Nam.

3. Representatives of the following specialized agencies and other organizations in the United Nations system attended the session: United Nations Educational, Scientific and Cultural Organization (UNESCO), International Telecommunication Union (ITU) and World Meteorological Organization (WMO).

4. The session was also attended by representatives of the European Space Agency (ESA), International Organization of Space Communications (INTERSPUTNIK), International Telecommunications Satellite Organization (INTELSAT), Committee on Space Research (COSPAR), European Association for the International Space Year (EURISY), International Academy of Astronautics (IAA), International Astronautical Federation (IAF), International Astronomical Union (IAU) and International Society for Photogrammetry and Remote Sensing (ISPRS).

5. A list of the representatives of Member States, specialized agencies and other international organizations attending the session is contained in document A/AC.105/C.1/INF.28.

6. On 22 February 1999, the Subcommittee adopted the following agenda:[1]

1. Adoption of the agenda.
2. Statement by the Chairman.
3. Preparations for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) by the Advisory Committee for UNISPACE III.
4. Space debris.

V.99-82289 (E)

5. United Nations Programme on Space Applications and the coordination of space activities within the United Nations system.

6. Other matters:

   (a) Schedule of work for the Scientific and Technical Subcommittee at its thirty-seventh session, in 2000;

   (b) Other reports.

7. Report to the Committee on the Peaceful Uses of Outer Space.

A. Meetings and documentation

7. The Subcommittee held 10 meetings.

8. A list of the documents that were before the Subcommittee is provided in annex I to the present report.

9. Following the adoption of the agenda, the Chairman made a statement outlining the work of the Subcommittee at its current session. He also reviewed the activities of Member States in space exploration, including important advances that had been achieved as a result of international cooperation during the past year.

10. At the 515th, 516th and 517th meetings, the Chairman informed the Subcommittee that requests had been received from the permanent representatives of Azerbaijan, Bolivia, Costa Rica, Finland, Peru, Slovakia and Tunisia, together with the permanent observer for the League of Arab States, to attend the session. Following past practice, those delegations were invited to attend the current session of the Subcommittee and to address it as appropriate, without prejudice to further requests of that nature; that action did not involve any decision of the Subcommittee concerning status, but was a courtesy that the Subcommittee extended to those delegations.

11. At the 515th meeting, the Director of the Office for Outer Space Affairs of the Secretariat made a statement reviewing the work programme of the Office. At the 518th meeting, the Expert on Space Applications made a statement outlining the activities carried out and planned under the United Nations Programme on Space Applications.

B. Technical presentations

12. In response to General Assembly resolution 53/45, F. Alby (France), P. Moskwa of the Inter-Agency Space Debris Coordination Committee (IADC) and W. Flury of ESA made technical presentations on the complex issue of space debris and the solutions currently being adopted at the national and international levels.

C. Recommendations of the Scientific and Technical Subcommittee

13. After considering the various items before it, the Subcommittee, at its 524th meeting, on 26 February 1999, adopted its report to the Committee on the Peaceful Uses of Outer Space, containing its views and recommendations as set out in the paragraphs below.

II. Preparations for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) by the Advisory Committee for UNISPACE III

14. The Advisory Committee noted that the General Assembly, in its resolution 52/56 of 10 December 1997, paragraph 23, had agreed that the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) should be convened at the United Nations Office at Vienna from 19 to 30 July 1999 as a special session of the Committee on the Peaceful Uses of Outer Space, open to all States Members of the United Nations.

15. The Advisory Committee also noted that the General Assembly, in its resolution 53/45, paragraph 22, had endorsed the recommendations of the Preparatory Committee at its 1998 session, contained in the report of the Committee on the Peaceful Uses of Outer Space on its forty-first session,[2] and had requested the Preparatory and Advisory Committees and the executive secretariat to

carry out their tasks in accordance with those recommendations.

16. The Advisory Committee further noted that the General Assembly, in its resolution 53/45, paragraph 18, had agreed that the Advisory Committee should reconvene the Working Group of the Whole at its 1999 session to assist the Advisory Committee in finalizing its preparatory work for UNISPACE III. Accordingly, the Advisory Committee requested the Working Group to give full consideration to the tasks entrusted to the Advisory Committee by the Assembly and to report thereon to the Advisory Committee.

17. At the 524th meeting of the Subcommittee, on 26 February 1999, the Advisory Committee adopted the report of the Working Group of the Whole, contained in annex II to the present report, and noted that the report of the Working Group provided the basis for the Preparatory Committee to finalize its preparations for UNISPACE III.

18. The Advisory Committee recommended that the Working Group of the Whole should be reconvened by the Scientific and Technical Subcommittee at its thirty-seventh session, in 2000, to assist the Subcommittee in considering its future work in the light of the recommendations of UNISPACE III.

III. Space debris

A. General matters

19. In accordance with General Assembly resolution 53/45, the Subcommittee continued its consideration, on a priority basis, of the agenda item on space debris.

20. The Subcommittee agreed that consideration of space debris was important and that international cooperation was needed to expand appropriate and affordable strategies to minimize the potential impact of space debris on future space missions.

21. The Subcommittee agreed that Member States should pay more attention to the problem of collisions of space objects, including those with nuclear power sources on board, with space debris and other aspects of space debris. It noted that the General Assembly, in its resolution 53/45, had called for the continuation of national research on that question, for the development of improved technology for the monitoring of space debris and for the compilation and dissemination of data on space debris. The Subcommittee recalled the request of the Assembly that information on those issues should be submitted to the Subcommittee, and it took note of the replies from Member States (A/AC.105/708 and Add.1 and 2) submitted to it in accordance with that request. The Subcommittee agreed that national research on space debris should continue and that Member States and international organizations should make available to all interested parties the results of that research, including information on practices adopted that had proved effective in minimizing the creation of space debris.

22. The Subcommittee heard scientific and technical presentations on the subject of space debris by representatives of France, IADC and ESA, as mentioned in paragraph 12 of the present report.

23. The Subcommittee took note of the conference room paper on space debris submitted by the Russian Federation, entitled "The forecast of technogenous contamination of the near-Earth space (NES) with various measures of its mitigation" (A/AC.105/C.1/1999/CRP.4).

24. The Subcommittee noted that cooperation had continued through IADC, with the participation of Japan, the National Aeronautics and Space Administration (NASA) of the United States, ESA, the Russian Space Agency, the China National Space Administration, the British National Space Centre, the Centre national d'études spatiales (CNES) of France, the Indian Space Research Organization and the German Aerospace Center (DLR), to enable its members to exchange information on space debris activities, facilitate opportunities for cooperation in space debris research, review the progress of ongoing activities and identify debris mitigation options. The Subcommittee also noted that the Italian Space Agency (ASI) had been admitted into IADC in 1998.

25. The Subcommittee noted with satisfaction that, following its invitation, a representative of IADC had made a technical presentation on its work with regard to the space debris issue, as mentioned in paragraph 12 of the present report. The Subcommittee agreed that IADC should be invited to make a technical presentation on its work at the thirty-seventh session of the Subcommittee.

26. The Subcommittee recalled that, in order to further its consideration of the agenda item on space debris, it had adopted at its thirty-second session a multi-year plan for the consideration of space debris. The Subcommittee also recalled that at each session it should review the current operational debris mitigation practices and consider future

mitigation methods with regard to cost-efficiency (A/AC.105/637 and Corr.1, para. 92).

27. The Subcommittee agreed that adoption of the technical report at its current session was an important achievement. The Subcommittee noted that, owing to the complexity of the space debris issue, its discussion of that issue should continue in order to ensure further progress in developing an understanding of the issue. The Subcommittee agreed that IADC, as the international expert organization on space debris, should continue to brief the Subcommittee on the issue on an annual basis, that the Subcommittee should assess the effectiveness of existing mitigation practices and the extent to which they were being implemented and that efforts to model and characterize the debris environment should continue.

B. Technical report on space debris

28. Concerned about the influence of space debris on the space environment and on the operation of spacecraft, the Subcommittee had included an item on space debris on the agenda for its thirty-first session, in 1994. It had been agreed that it was important to have a firm scientific and technical basis for future action on the complex attributes of space debris.

29. The Subcommittee had agreed to focus on understanding research related to space debris, including debris measurement techniques; mathematical modelling of the debris environment; characterizing the space debris environment; and measures to mitigate the risks of space debris, including spacecraft design measures to protect against space debris. Accordingly, a multi-year work plan had been adopted in 1995 for specific topics to be covered during the period 1996-1998. It had also been agreed that the work plan should be implemented with flexibility, so that all relevant issues on space debris could be addressed.

30. The Subcommittee had agreed, at its thirty-third session, to prepare a technical report on space debris that would be structured according to the specific topics addressed by the work plan during the period 1996-1998. The report would be carried forward and updated each year, leading to an accumulation of advice and guidance, in order to establish a common understanding that could serve as the basis for further deliberations of the Committee on that important matter (A/AC.105/637 and Corr.1, para. 96).

31. The Subcommittee noted that, at its thirty-third session, in accordance with the multi-year plan, it had focused its attention on measurements of space debris, understanding of data and effects of that environment on space systems, as reflected in its technical report for 1996 (A/AC.105/637 and Corr.1, paras. 94-138). At its thirty-fourth session, the Subcommittee had focused its attention on the modelling of the space debris environment and risk assessment, as reflected in its technical report for 1997 (A/AC.105/672, paras. 102-104). At its thirty-fifth session, the Subcommittee had focused its attention on space debris mitigation measures, as reflected in its technical report for 1998 (A/AC.105/697 and Corr.1, paras. 97-99).

32. The Subcommittee had agreed, at its thirty-fifth session, that the draft technical report of the Subcommittee on space debris, which would include the part on mitigation measures drafted during that session, should be adopted at its thirty-sixth session, in 1999, after final editing during the inter-sessional period and consideration by relevant organizations, such as IADC and IAA (A/AC.105/697 and Corr.1, para. 95).

33. The Subcommittee noted with satisfaction the draft of the complete technical report on space debris (A/AC.105/707), which also contained the technical changes and amendments that had been proposed by Canada, France, Germany and the United Kingdom and by IADC during the inter-sessional period. The Subcommittee also noted that an introduction and an annex containing a list of documents relevant to the subject of space debris had been prepared by the Secretariat.

34. The Subcommittee took note of the comments prepared during the session by the drafting group on the draft technical report on space debris, contained in conference room paper A/AC.105/C.1/1999/CRP.3.

35. The Subcommittee adopted the draft technical report on space debris (A/AC.105/707), together with the changes proposed by the drafting group. The Subcommittee noted that the technical report on space debris would be submitted to the Committee on the Peaceful Uses of Outer Space at its forty-second session. The Subcommittee agreed to have the technical report widely distributed, including by making it available to UNISPACE III, the Legal Subcommittee at its thirty-ninth session, in 2000, international organizations such as COSPAR, IAA, IAF and IADC and other scientific meetings such as the annual IAF Congress.

36. The Subcommittee also agreed that the technical report on space debris should be reviewed as appropriate and should be updated as new technological developments occurred and as the technical understanding of the space debris environment improved.

37. The Scientific and Technical Subcommittee expressed its appreciation to the Chairman, Dietrich Rex (Germany), whose invaluable expertise in space debris matters had greatly facilitated the work of the Subcommittee on the technical report.

C. General views

38. The view was expressed that there was a need to develop a common database for space debris that could serve as a clearing house of information for the international community for research and further advancement of knowledge in that field.

39. Some delegations expressed the view that issues relating to the cost implications of space debris mitigation measures needed further analysis and warranted the full attention of the Scientific and Technical Subcommittee in the future.

40. Some delegations expressed the view that there should be follow-up activity by the Legal Subcommittee on the technical report on space debris. Those delegations were of the view that the Committee on the Peaceful Uses of Outer Space should consider submitting the technical report to the Legal Subcommittee so that it could decide what implications the report might have regarding its work programme. Other delegations expressed the view that it was still premature for the Legal Subcommittee to discuss the issue of space debris, and that the discussion of the issue by the Legal Subcommittee should be postponed at least until the technical report had been thoroughly analysed by Member States and relevant space-related organizations and industry.

41. Some delegations expressed the view that, in the light of the completion by the Scientific and Technical Subcommittee of the multi-year work plan and the technical report on space debris, the Committee on the Peaceful Uses of Outer Space might wish to have the Legal Subcommittee consider presenting its views on the applicability of the existing outer space treaties in relation to space debris.

42. The Scientific and Technical Subcommittee recommended that the item entitled "Space debris" be retained as a priority item on the agenda for its thirty-seventh session.

IV. United Nations Programme on Space Applications and the coordination of space activities within the United Nations system

43. In accordance with General Assembly resolution 53/45, paragraph 13 (c), the Subcommittee continued its consideration of the item on a priority basis.

A. United Nations Programme on Space Applications

44. The Subcommittee had before it the report of the United Nations Expert on Space Applications (A/AC.105/715). The report was supplemented by a statement from the Expert. The Subcommittee noted that the United Nations Programme on Space Applications for 1998 had been carried out satisfactorily and commended the work accomplished by the Expert in that regard; in particular, the Subcommittee expressed its appreciation for the organization of the regional preparatory conferences for UNISPACE III.

45. The Subcommittee noted with appreciation that, since its previous session, additional contributions for 1998 and 1999 had been offered by various Member States and organizations and that they had been acknowledged in the report of the Expert (A/AC.105/715, paras. 41-42).

46. The Subcommittee continued to express its concern over the still limited financial resources available for carrying out the United Nations Programme on Space Applications and appealed to Member States to support the Programme through voluntary contributions. The Subcommittee felt that the limited resources of the United Nations should be focused on the activities with the highest priority and noted that the United Nations Programme on Space Applications was the priority activity of the Office for Outer Space Affairs.

1. Period 1998-1999

United Nations conferences, training courses, workshops and symposia

47. With regard to the activities of the Programme carried out in 1998 and early in 1999, the Subcommittee expressed its appreciation to the following:

(a) The Government of India, as well as ESA, for co-sponsoring the Workshop on Emerging Trends in Satellite Meteorology, hosted by the Centre for Space Science and Technology in Asia and the Pacific and the Indian Space Research Organization and held in Ahmedabad from 9 to 12 March 1998;

(b) ISPRS, as well as Spectrum Astro, Inc., Lockheed Martin Corporation and the Federal Laboratory Consortium, for co-sponsoring the Second United Nations International Conference on Spin-off Benefits of Space Technology, hosted by ISPRS and held in Tampa, Florida, United States, from 30 March to 3 April 1998;

(c) The Government of Malaysia, as well as ESA, for co-sponsoring the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Asia and the Pacific, hosted by the Space Sciences Division of the Ministry of Science, Technology and the Environment and held in Kuala Lumpur from 18 to 22 May 1998;

(d) The Government of Sweden, represented by the Swedish International Development Agency, for co-sponsoring the Eighth United Nations International Training Course on Remote Sensing Education for Educators, hosted by Stockholm University and the Swedish Space Corporation and held in Stockholm and Kiruna, Sweden, from 4 May to 12 June 1998;

(e) The Government of Austria, as well as the province of Styria, the city of Graz and ESA, for co-sponsoring the United Nations/European Space Agency Symposium on Economic Benefits of Using Space Technology Applications in Developing Countries, held in Graz, Austria, from 7 to 10 September 1998;

(f) The Government of Spain, as well as ESA, for co-sponsoring the United Nations Workshop on Space Technology for Emergency Aid/Search and Rescue Satellite-Aided Tracking System for Ships in Distress, hosted by the National Institute for Aerospace Technology (INTA) of Spain and held in Maspalomas, Gran Canaria, Spain, on 24 and 25 September 1998;

(g) The Government of Australia, IAF and CNES of France for co-sponsoring the United Nations/International Astronautical Federation Workshop on Expanding the User Community of Space Technology in Developing Countries, hosted by the Cooperative Research Centre for Satellite Systems and held in Melbourne, Australia, from 24 to 27 September 1998;

(h) The Government of Chile, as well as ESA, for co-sponsoring the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Latin America and the Caribbean, hosted by the Ministry of Foreign Affairs, the University of Concepción and Intendencia de la Región del Biobio and held in Concepción, Chile, from 12 to 16 October 1998;

(i) The Government of Sweden for co-sponsoring the Workshop on the Evaluation of the United Nations/Sweden International Training Course Series on Remote Sensing Education for Educators, hosted by the Swedish International Development Agency and Stockholm University and held in Gaborone from 18 to 21 October 1998;

(j) The Government of Morocco, as well as ESA, for co-sponsoring the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Africa and the Middle East, hosted by the Royal Centre for Remote Sensing of Morocco and held in Rabat from 26 to 30 October 1998;

(k) The Government of Romania, as well as ESA, for co-sponsoring the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Eastern Europe, hosted by the Romanian Space Agency and held in Bucharest from 25 to 29 January 1999.

48. The Subcommittee took note of the status of United Nations workshops, training courses, symposia and conferences planned for 1999, including the following, which were described in the report of the Expert on Space Applications (A/AC.105/715, annex IV):

(a) United Nations/European Space Agency Workshop on Basic Space Science, to be held in Mafraq, Jordan, from 13 to 17 March 1999;

(b) American Institute of Aeronautics and Astronautics Workshop on International Space Cooperation:

Solving Global Problems, to be held in Bermuda from 11 to 15 April 1999;

(c) Regional workshop on the role of the African Regional Centre for Space Science and Technology—in French language in national and regional development, to be held in Rabat in the second or third quarter of 1999;

(d) Regional workshop on the role of the African Regional Centre for Space Science and Technology Education—in English language in national and regional development, to be held in Ile-Ife, Nigeria, in the second or third quarter of 1999;

(e) Ninth United Nations/Sweden International Training Course on Remote Sensing Education for Educators, to be held in Stockholm and Kiruna, Sweden, from 3 May to 11 June 1999;

(f) United Nations/China/European Space Agency Conference on Space Applications in Promoting Sustainable Agriculture, to be held in Beijing from 14 to 17 September 1999;

(g) Second United Nations Workshop on Space Technology for Emergency Aid/Search and Rescue Satellite-Aided Tracking System for Ships in Distress, to be held in Maspalomas, Gran Canaria, Spain, in September 1999;

(h) United Nations/International Astronautical Federation Workshop on Space: An Integral Part of Sustainable Development, being co-sponsored by ESA and the European Commission and organized in cooperation with the Government of the Netherlands and the International Institute for Aerospace Survey and Earth Sciences (ITC), to be held in Amsterdam and Enschede, Netherlands, from 30 September to 3 October 1999;

(i) Post-UNISPACE III briefing at the Second Asia-Pacific Ministerial Conference on Space Applications for Sustainable Development, to be held in New Delhi from 2 to 8 December 1999.

Long-term fellowships for in-depth training

49. The Subcommittee expressed appreciation to ESA for having offered five training fellowships in various areas relating to space activities for the period 1998-1999. The status of the fellowships for the period 1998-1999 and the countries whose candidates had received fellowships were indicated in the report of the Expert on Space Applications (A/AC.105/715, annex II).

50. The Subcommittee noted with satisfaction that China had offered to the United Nations Programme on Space Applications two long-term fellowships for the period 1998-1999.

51. The Subcommittee noted that it was important to increase the opportunities for in-depth education in all areas of space science, technology and applications projects through long-term fellowships and urged Member States to make such opportunities available at their relevant institutions.

Technical advisory services

52. The Subcommittee took note of the technical advisory services being provided under the United Nations Programme on Space Applications in support of projects on regional space applications, as indicated in the report of the Expert on Space Applications (A/AC.105/715, paras. 20-35):

(a) Assistance in the growth and operation of the Asia-Pacific Satellite Communications Council;

(b) Collaboration with several African countries on the implementation of the project on cooperative information network linking scientists, educators, professionals and decision makers in Africa (COPINE), pursuant to one of the recommendations of the United Nations Regional Conference on Space Technology for Sustainable Development in Africa, held in Dakar from 25 to 29 October 1993, regarding the establishment, as a matter of urgency, of an efficient communications network among African and European professionals and scientists at the national, continental and intercontinental levels;

(c) Collaboration with ESA and the Department of Economic and Social Affairs of the Secretariat on follow-up activities related to the recommendations of the training courses on applications of the remote sensing satellite data to natural resources, renewable energy and the environment held in Frascati, Italy, in 1993, 1994, 1995 and 1997;

(d) Collaboration with ESA on follow-up activities relating to the series of workshops on basic space science;

(e) Follow-up to the United Nations international training course series in Sweden on remote sensing education for educators;

(f) Contribution to the Committee on Earth Observation Satellites (CEOS) proposal on the Integrated Global Observing Strategy.

Promotion of greater cooperation in space science and technology

53. The Subcommittee noted that the United Nations was collaborating with international professional bodies within the space community to promote the exchange of experiences on space activities. The United Nations Programme on Space Applications had co-sponsored the United Nations/International Astronautical Federation Workshop on Expanding the User Community of Space Technology in Developing Countries, held in Melbourne in September 1998, in conjunction with the forty-ninth Congress of the International Astronautical Federation. Participants from developing countries at the Workshop also attended the Congress.

54. The Subcommittee noted that the United Nations Programme on Space Applications had co-sponsored the participation of scientists from developing countries in the thirty-second Scientific Assembly of the Committee on Space Research, held in Nagoya, Japan, from 12 to 19 July 1998.

55. The Subcommittee noted that the United Nations Programme on Space Applications would co-sponsor the participation of scientists from developing countries in the United Nations/International Astronautical Federation Workshop on Space: An Integral Part of Sustainable Development, to be held in Amsterdam and Enschede from 30 September to 3 October 1999, in conjunction with the fiftieth Congress of the International Astronautical Federation, and that participants at the Workshop would also attend the Congress, which would be held from 4 to 8 October 1999.

2. Year 2000

United Nations conferences, training courses, workshops and symposia

56. The Subcommittee recommended the approval, after appropriate consultations, of the following programme of workshops, training courses, symposia and conferences planned for 2000:

(a) Tenth United Nations/Sweden International Training Course on Remote Sensing Education for Educators;

(b) United Nations/European Space Agency/Committee on Space Research Workshop on Data Analysis Techniques, to be held in India;

(c) United Nations/Austria Symposium on space technology and development, to be held in Graz, Austria;

(d) United Nations/International Astronautical Federation Workshop on space technology for the benefit of developing countries, to be held in Rio de Janeiro.

57. The Subcommittee noted that other activities would be organized under the auspices of the United Nations Programme on Space Applications on the basis of recommendations of UNISPACE III.

B. International space information service

58. The Subcommittee noted with satisfaction that the Office for Outer Space Affairs had continued to develop a World Wide Web home page (http://www.un.or.at/OOSA/index.html), including both information within the United Nations system and access to external databases.

59. The Subcommittee noted with satisfaction the publication of the document entitled *Seminars of the United Nations Programme on Space Applications: Selected Papers on Remote Sensing, Space Science and Information Technology* (A/AC.105/711).

C. Reports

60. The Subcommittee took note with appreciation of the reports submitted to it by Member States and international organizations in response to the recommendations of the Working Group of the Whole in its report on the work of its eleventh session.

D. Coordination of space activities within the United Nations system and inter-agency cooperation

61. The Subcommittee noted that the General Assembly, in its resolution 53/45, paragraph 24, had encouraged all Member States, organizations within the United Nations system and other international organizations with space activities to contribute actively to achieving the objectives of UNISPACE III.

62. The Subcommittee continued to stress the necessity of ensuring continuous and effective consultations and

coordination in the field of outer space activities among organizations within the United Nations system and the avoidance of duplicative activities. The Subcommittee also noted that the United Nations Programme on Space Applications should enhance coordination efforts with regional space events such as the Regional Space Applications Programme for Sustainable Development in Asia and the Pacific of the Economic and Social Commission for Asia and the Pacific (ESCAP).

63. The Subcommittee noted with satisfaction that the Inter-Agency Meeting on Outer Space Activities had held its nineteenth session at the United Nations Office at Vienna on 2 and 3 June 1998 and that the report on its deliberations (A/AC.105/701) and the report of the Secretary-General entitled "Coordination of outer space activities within the United Nations system: programme of work for 1998 and 1999 and future years" (A/AC.105/700) were before the Subcommittee.

64. The Subcommittee noted that the sessions of the Inter-Agency Meeting on Outer Space Activities would continue to be convened at the United Nations Office at Vienna and to be hosted by the Office for Outer Space Affairs prior to the sessions of the Scientific and Technical Subcommittee each year, without prejudice to any invitation by an interested agency to host a session at its headquarters. The Subcommittee noted that the twentieth session of the Inter-Agency Meeting on Outer Space Activities, scheduled to be held at the United Nations Office at Vienna from 2 to 4 February 2000, would address, among other things, coordination of activities related to the plan of action of UNISPACE III.

E. Regional and interregional cooperation

65. The Subcommittee noted with appreciation the continuing efforts undertaken by the United Nations Programme on Space Applications, in accordance with General Assembly resolution 45/72 of 11 December 1990, in leading an international effort to establish regional centres for space science and technology education in existing national or regional educational institutions in developing countries. The Subcommittee also noted that, once established, each centre could expand and become part of a network that could cover specific programme elements in established institutions related to space science and technology in each region.

66. The Subcommittee recalled that the General Assembly, in its resolution 50/27 of 6 December 1995, had endorsed the recommendation of the Committee that the centres be established on the basis of affiliation to the United Nations as early as possible and that such affiliation would provide the centres with the necessary recognition and would strengthen the possibilities of attracting donors and of establishing academic relationships with national and international space-related institutions.

67. The Subcommittee recalled that the General Assembly, in its resolution 53/45, had noted with satisfaction that, in accordance with paragraph 30 of its resolution 50/27, the Centre for Space Science and Technology Education in Asia and the Pacific had continued its education programme in 1998 and that significant progress had been achieved in establishing regional centres for space science and technology education in the other regions.

68. The Subcommittee noted with satisfaction that the Centre for Space Science and Technology Education in Asia and the Pacific would conduct its seventh nine-month course at the Space Applications Centre at Ahmedabad, India, from 1 July 1999 to 31 March 2000. The theme of the course would be satellite communications.

69. The Subcommittee recommended that the Member States concerned in Asia and the Pacific should undertake further consultations, with the assistance of the Office for Outer Space Affairs, with a view to making the Centre for Space Technology Education in Asia and the Pacific grow into a network of nodes.

70. The Subcommittee noted with satisfaction that the African Regional Centre for Space Science and Technology—in French language had been inaugurated on 24 October 1998 in Morocco and that its first programme event would be a seminar lasting 2-3 days that would be attended by senior administrative and scientific representatives of each of the participating countries. The Subcommittee also noted with satisfaction that the African Regional Centre for Space Science and Technology Education—in English language had been inaugurated on 24 November 1998 in Nigeria and that a document on the proposed activities of the Centre, which had been developed for implementation in March 1999, as well as other matters relating to the Centre, would be reviewed at the resumed session of the Governing Board of the Centre in 1999.

71. The Subcommittee noted with satisfaction that the regional centre for space science and technology education in Latin America and the Caribbean, to be located in Brazil and Mexico, was expected to be inaugurated in 1999 and that, in preparation for the opening of the campus of the centre in Brazil, the National Institute for Space Research (INPE) of Brazil had carried out a number of activities for the benefit of States in the region, as presented in the report of the Expert on Space Applications (A/AC.105/715, para. 12).

72. The Subcommittee noted that missions had been sent to Jordan and the Syrian Arab Republic from 24 June to 1 July 1998 to evaluate the establishment of a regional centre for space science and technology education in western Asia and that the reports of those missions were being finalized, in consultation with the Governments of the two countries, with a view to selecting a host country for the Centre.

73. The Subcommittee noted that a mission had been sent to Bulgaria, Greece, Hungary, Poland, Romania and Turkey from 24 November to 7 December 1998, with the objective of undertaking a technical study and providing a report that could be used in determining an agreed framework for the operation of a network of space science and technology education and research institutions for central eastern and south-eastern European countries. The Subcommittee also noted that the steering committee for the network had held a meeting during the current session to discuss further procedures for the operation of the network.

74. The Subcommittee noted that the satellite-based COPINE project would offer an excellent opportunity for the exchange of information needed to promote progress in health care, agriculture, education, science and technology, and the management and survey of natural resources and the environment in Africa. The Subcommittee noted that such cooperation would provide long-term benefits to the participating African countries and would contribute to economic growth in the region. The Subcommittee also noted that the Provisional Governing Board of COPINE, at its meeting held in London on 27 April 1998, had made conclusions and recommendations concerning the future of the project (A/AC.105/715, para. 21). It was noted that the Office for Outer Space Affairs was continuing consultations on the implementation of the project with a number of interested countries.

75. The Subcommittee noted with satisfaction that the regional preparatory conferences for UNISPACE III, mentioned in paragraph 47 above, had served to promote regional and interregional cooperation.

76. The Subcommittee emphasized the importance of regional and international cooperation in making the benefits of space technology available to all countries by such cooperative activities as sharing payloads, disseminating information on spin-off benefits, ensuring compatibility of space systems and providing access to launch capabilities at reasonable cost.

V. Other matters

A. Review of the future work of the Scientific and Technical Subcommittee

77. In adopting the agenda for its thirty-sixth session, the Subcommittee recalled that consideration of several agenda items had been suspended for one year in accordance with General Assembly resolution 53/45, paragraph 14, and that consideration of those items was to be resumed at its thirty-seventh session. The Subcommittee also recalled that it should identify at its thirty-sixth session the theme fixed for special attention of the Subcommittee at its thirty-seventh session.

78. The Subcommittee noted that, in accordance with General Assembly resolution 53/45, the agenda for its thirty-seventh session should include the following priority items:

(a) United Nations Programme on Space Applications and the coordination of space activities within the United Nations system;

(b) Matters relating to the remote sensing of Earth by satellite, including applications for developing countries;

(c) Use of nuclear power sources in outer space;

(d) Space debris.

79. The Subcommittee noted that, in accordance with General Assembly resolution 53/45, the agenda for its thirty-seventh session should also include the following items:

(a) Questions relating to space transportation systems and their implications for future activities in outer space;

(b) Examination of the physical nature and technical attributes of the geostationary orbit and of its

utilization and applications, including in the field of space communications, as well as other questions relating to space communications developments, taking particular account of the needs and interests of developing countries;

(c) Matters relating to life sciences, including space medicine;

(d) Progress in national and international space activities related to the Earth's environment, in particular progress in the International Geosphere-Biosphere (Global Change) Programme;

(e) Matters relating to planetary exploration;

(f) Matters relating to astronomy;

(g) Consideration of the theme fixed for special attention at the thirty-seventh session of the Scientific and Technical Subcommittee.

80. The Subcommittee agreed that it should review the structure of its agenda taking into account the recommendations of UNISPACE III and that that task could be accomplished under its agenda item entitled "Other matters".

81. The Subcommittee agreed that at its thirty-seventh session, in 2000, the theme fixed for special attention should be "Space commercialization: an era of new opportunities". The Subcommittee recalled that, at its thirty-fifth session, it had recommended that COSPAR and IAF, in liaison with Member States, should be invited to arrange a symposium with as wide a participation as possible, to be held during the first week of the thirty-seventh session of the Subcommittee, in order to complement its discussions on the special theme (A/AC.105/697 and Corr.1, para. 155).

82. The Subcommittee recalled that the Committee on the Peaceful Uses of Outer Space, at its forty-first session, had agreed that the Scientific and Technical Subcommittee and the Legal Subcommittee would invite special presentations on new launch systems and ventures at their sessions in 2000 with a view to attaining a better understanding of those launch activities.[3]

83. In accordance with the four-year work plan for developing a framework on safety assurance processes and standards for nuclear power sources in outer space, the Subcommittee requested the Secretariat to invite Member States and international organizations to submit to the Subcommittee at its thirty-seventh session, in 2000, information on the identification of terrestrial processes and technical standards that might be relevant to nuclear power sources, including factors that distinguished nuclear power sources in outer space from terrestrial nuclear applications.[4]

84. Some delegations expressed the view that the Subcommittee needed to have a modified agenda to include extensive discussions on possible new items.

85. Some delegations proposed new items for the agenda of the Subcommittee at its thirty-seventh session in 2000, and at its thirty-eighth session, in 2001. Those delegations were of the view that the new agenda items, contained in a working paper submitted by Germany on behalf of Austria, Canada, China, Czech Republic, France, Greece, Hungary, Italy, Japan, Morocco, Romania, Russian Federation, Spain, Sweden, Turkey, United Kingdom of Great Britain and Northern Ireland and United States of America (A/AC.105/C.1/L.227), would limit the amount of information not related to agenda items that was reported at the sessions of the Subcommittee, focus the work of the Subcommittee on its agenda items and facilitate the consideration by the Subcommittee of the results and recommendations of UNISPACE III. The delegations of those countries were of the view that the draft provisional agenda items proposed in the working paper should be recommended by the Committee at its next session, in July 1999, for approval by the General Assembly at its fifty-fourth session.

86. The view was expressed that an item entitled "Matters relating to the remote sensing of Earth by satellite, including applications for developing countries and monitoring of Earth's environment", should be a substantive item of the agenda of the Scientific and Technical Subcommittee.

87. The Subcommittee agreed that the proposal contained in document A/AC.105/C.1/L.227 could constitute the basis for consensus at the 1999 session of the Committee on the Peaceful Uses of Outer Space while, in addition, taking into account the views expressed by other delegations.

88. The view was expressed that, for a meaningful discussion of the geostationary orbit, it was necessary to know what objects were in the geostationary orbit and which of them were in service and that, on that basis, the Subcommittee would be able to determine whether or not the item on the geostationary orbit should continue to be on its agenda.

89. Some delegations expressed the view that the item on the geostationary orbit should remain on the agenda of the Subcommittee.

90. The Subcommittee recommended that its thirty-seventh session be held from 7 to 18 February 2000.

B. Future election of the Rapporteur of the Committee

91. The Subcommittee noted with satisfaction that the African Group had nominated Mohammed Aït Belaïd (Morocco) to fill the vacant post of Rapporteur of the Committee on the Peaceful Uses of Outer Space and that the election of the Rapporteur would take place at the session of the Committee that would be held in July 1999.

C. Other reports

92. The Subcommittee welcomed the annual reports of ESA (A/AC.105/716), INTELSAT (A/AC.105/717) and NASA (A/AC.105/718). The Subcommittee requested those organizations to continue to report on their work.

93. The Subcommittee expressed its appreciation to COSPAR for its report on the progress in space research and to IAF for its report on space technology and applications, the two reports being compiled by the Office for Outer Space Affairs and issued jointly under the title *Highlights in Space: Progress in Space Science, Technology and Applications, International Cooperation and Space Law*, 1998 (A/AC.105/710).

94. The Subcommittee noted with appreciation the participation in its current session of representatives of United Nations bodies and specialized agencies and permanent observers. The Subcommittee noted that their statements and reports had been helpful in enabling it to fulfil its role as focal point for international cooperation in space.

Notes

[1] In paragraph 14 of its resolution 53/45 of 3 December 1998, the General Assembly endorsed the recommendation of the Committee on Peaceful Uses of Outer Space that, in view of the abbreviated schedule of work of the Scientific and Technical Subcommittee at its thirty-sixth session and the preparatory work to be conducted for UNISPACE III, the Subcommittee should suspend, as an exception, its consideration of the following items for one year, to be resumed at its thirty-seventh session, in the year 2000:

(a) General exchange of views;

(b) Matters relating to the remote sensing of the Earth by satellites, including, *inter alia*, applications for developing countries;

(c) Use of nuclear power sources in outer space;

(d) Questions relating to space transportation systems and their implications for future activities in space;

(e) Examination of the physical nature and technical attributes of the geostationary orbit and of its utilization and applications, including, *inter alia*, in the field of space communications, as well as other questions relating to space communications developments, taking particular account of the needs and interests of developing countries;

(f) Matters relating to life sciences, including space medicine;

(g) Progress in national and international space activities related to the Earth's environment, in particular progress in the International Geosphere-Biosphere (Global Change) Programme;

(h) Matters relating to planetary exploration;

(i) Matters relating to astronomy;

(j) The theme fixed for the special attention of the Subcommittee

[2] *Official Records of the General Assembly, Fifty-third Session, Supplement No. 20* (A/53/20), paras. 23-44.

[3] Ibid., para. 153.

[4] Ibid. para. 91.

Annex I

Documents before the Scientific and Technical Subcommittee at its thirty-sixth session

Item 1. Adoption of the agenda

A/AC.105/C.1/L.225	Provisional agenda, with annotations, for the thirty-sixth session

Item 3. Preparations for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) by the Advisory Committee for UNISPACE III

A/CONF.184/2	Provisional rules of procedure of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space
A/CONF.184/PC/1	Draft report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space
A/CONF.184/PC/2	Report on the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Asia and the Pacific (Kuala Lumpur, 18-22 May 1998)
A/CONF.184/PC/3	Report on the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Latin America and the Caribbean (Concepción, Chile, 12-16 October 1998)
A/CONF.184/PC/4	Report on the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Africa and the Middle East (Rabat, 26-30 October 1998)
A/CONF.184/PC/5	Report on the Regional Preparatory Conference for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space for Eastern Europe (Bucharest, 25-29 January 1999)
A/CONF.184/PC/L.4	Organizational matters relating to the holding of UNISPACE III
A/CONF.184/PC/L.5 and Add.1	Recommendations of the regional preparatory conferences for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space

Item 4. Space debris

A/AC.105/707	Draft technical report on space debris of the Scientific and Technical Subcommittee
A/AC.105/708 and Add.1 and 2	National research on space debris, safety of nuclear-powered satellites and problems of collisions of nuclear-powered sources with space debris

Item 5. United Nations Programme on Space Applications and the coordination of space activities within the United Nations system

A/AC.105/715	Report of the Expert on Space Applications
A/AC.105/704	Report on the Eighth United Nations International Training Course on Remote Sensing Education for Educators (Stockholm and Kiruna, Sweden, 4 May-12 June 1998)
A/AC.105/706	Report on the Second United Nations International Workshop on Spin-off Benefits of Space Technology: Challenges and Opportunities (Tampa, Florida, United States of America, 30 March-3 April 1998)
A/AC.105/709	Report on the Workshop on the Evaluation of the United Nations/Swedish International Development Agency International Training Course Series on Remote Sensing Education for Educators (Gaborone, 18-21 October 1998)
A/AC.105/711	Seminars of the United Nations Programme on Space Applications: Selected Papers on Remote Sensing, Space Science and Information Technology
A/AC.105/712	Report on the United Nations/European Space Agency Symposium on Economic Benefits of Using Space Technology Applications in Developing Countries (Graz, Austria, 7-10 September 1998)
A/AC.105/713	Report on the United Nations Workshop on Space Technology for Emergency Aid/Search and Rescue Satellite-Aided Tracking System for Ships in Distress (Maspalomas, Gran Canaria, Spain, 24 and 25 September 1998)
A/AC.105/714	Report on the United Nations/International Astronautical Federation Workshop on Expanding the User Community of Space Technology Applications in Developing Countries (Melbourne, Australia, 24-27 September 1998)

Item 6. Other matters

A/AC.105/710	Highlights in Space, 1998: Progress in Space Science, Technology and Applications, International Cooperation and Space Law
A/AC.105/716	Report of the European Space Agency
A/AC.105/717	Report of the International Telecommunications Satellite Organization
A/AC.105/718	Report of the National Aeronautics and Space Administration
A/AC.105/C.1/L.227	Proposal on revising the agenda of the Scientific and Technical Subcommittee following the convening of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space: working paper submitted by Germany on behalf of Austria, Canada, China, Czech Republic, France, Greece, Hungary, Italy, Japan, Morocco, Romania, Russian Federation, Spain, Sweden, Turkey, United Kingdom of Great Britain and Northern Ireland and United States of America
A/AC.105/C.1/1999/CRP.5	Revision to the medium-term plan for the period 1998-2001

Item 7. Report to the Committee on the Peaceful Uses of Outer Space

A/AC.105/C.1/L.226 and Add.1-3	Draft report of the Scientific and Technical Subcommittee on the work of its thirty-sixth session

Working Group of the Whole

A/AC.105/C.1/WG.6/L.14	Draft report of the Working Group of the Whole

Annex II

Report of the Working Group of the Whole

1. In accordance with General Assembly resolution 53/45, paragraph 18, the Working Group of the Whole was reconvened at the thirty-sixth session of the Scientific and Technical Subcommittee to assist the Advisory Committee in finalizing its preparatory work for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III). The Working Group held nine meetings from 22 to 26 February 1999. At its ninth meeting, on 26 February 1999, it adopted the present report.

2. It was recalled that, at its previous sessions, the Working Group had carried out its work under the chairmanship of Muhammad Nasim Shah (Pakistan). It was decided that, in his absence, the Working Group would carry out its work under the chairmanship of Ulrike Butschek (Austria). It was agreed that the Acting Chairperson would be assisted by Latha Reddy (India) in coordinating the work related to the organizational matters relating to UNISPACE III.

3. The Working Group noted that the General Assembly, in its resolution 52/56, had agreed that UNISPACE III should be convened at the United Nations Office at Vienna from 19 to 30 July 1999 as a special session of the Committee on the Peaceful Uses of Outer Space, open to all States Members of the United Nations. The Working Group also noted that the Assembly, in its resolution 53/45, had endorsed the recommendations of the Preparatory Committee at its 1998 session[a] and had requested the Preparatory and Advisory Committees and the executive secretariat to carry out their tasks in accordance with those recommendations.

A. Preparation of the draft report

4. The Working Group recalled that the executive secretariat would circulate to the Member States, at the end of September 1998, the draft report and the revised version of the draft Vienna Declaration on Space and Human Development, along with the draft executive summary, to be revised on the basis of comments received from Member States. The Working Group also recalled that the executive secretariat would provide a compilation of the recommendations from the regional preparatory conferences for UNISPACE III and other comments to be received from Member States for consideration by the Advisory Committee, at its 1999 session, for inclusion in the draft report, the draft executive summary and the draft of the Vienna Declaration.[b]

5. The Working Group had before it a note by the Secretariat (A/CONF.184/PC/1) containing the revised text of the full draft report, which had been prepared on the basis of detailed comments made by the Preparatory Committee at its 1998 session. The Working Group noted that the document contained the text of the draft Declaration as revised by the Preparatory Committee and the text of the draft executive summary as revised by the executive secretariat on the basis of comments made by the Preparatory Committee. The Working Group also had before it documents containing the recommendations of the regional preparatory conferences for UNISPACE III for Asia and the Pacific and for Africa and the Middle East (A/CONF.184/PC/L.5) and for Latin America and the Caribbean and for Eastern Europe (A/CONF.184/PC/L.5/Add.1).

6. The Working Group noted that draft revised texts of the Vienna Declaration had been submitted by the United Kingdom of Great Britain and Northern Ireland, on behalf of States members of the European Space Agency, including Canada (A/CONF.184/PC/CRP.14) and by the Czech Republic (A/CONF.184/PC/CRP.17). The Working Group had before it a document containing a composite text prepared by the executive secretariat that included the proposals made by Member States for the draft of the Vienna Declaration (A/CONF.184/PC/CRP.18).

7. The Working Group considered, section by section, the revised draft annexed to a note by the Secretariat (A/CONF.184/PC/1), as well as an additional text on strengthening the activities of the United Nations Programme on Space Applications (A/CONF.184/PC/CRP.20), together with a correction introduced by the Director of the Office for Outer Space Affairs, and provided detailed comments to finalize the text. On the basis of comments made in the Working Group on the

composite text prepared by the executive secretariat, the Working Group prepared a revised draft of the Vienna Declaration (A/CONF.184/PC/CRP.18/Rev.1), to which all the recommendations of the preparatory regional conferences for UNISPACE III would be annexed.

8. The Working Group agreed that, on the basis of the above-mentioned comments, the executive secretariat should revise the draft of the Vienna Declaration and finish preparing the draft report well ahead of the 1999 session of the Preparatory Committee, for distribution to all Member States, so that the draft report could be forwarded to UNISPACE III.

B. Organization

9. The Working Group recalled the agreement of the Preparatory Committee at its 1998 session that the Advisory Committee, at its 1999 session, should reach agreement on the distribution of the remaining offices for UNISPACE III and the allocation of agenda items of UNISPACE III between Committee I and Committee II. The Working Group also recalled that the Preparatory Committee had requested the executive secretariat to submit proposals to assist the Advisory Committee in considering those matters.[5]

10. The Working Group had before it a report prepared by the Secretariat on organizational matters relating to the holding of UNISPACE III (A/CONF.184/PC/L.4) and documents prepared by the Secretariat containing additional and updated information for that report (A/CONF.184/PC/CRP.12 and Add.1).

11. On the basis of its deliberations, the Working Group agreed on a number of issues concerning the organization of UNISPACE III, which are presented below.

1. Distribution of offices of the General Committee and establishment of a drafting group

12. The Working Group recalled the agreement of the Working Group of the Whole of the Committee on the Peaceful Uses of Outer Space at its 1998 session on the provisional rules of procedure for UNISPACE III,[4] in particular rule 6, paragraph 2, concerning the establishment of a drafting group for UNISPACE III, and rule 7, paragraph 2, concerning the offices of the General Committee and their equitable geographical distribution.

13. The Working Group noted the candidates nominated by the regional groups to become officers of the General Committee of UNISPACE III and agreed on the following composition and distribution of offices for the Conference: for the Plenary, U. R. Rao (India) as President, Raimundo González (Chile) as Vice-President, and Mohammed Aït Belaïd (Morocco) as Rapporteur-General; for Committee I, Dietrich Rex (Germany) as Chairman, Yuri Koptev (Russian Federation) as Vice-Chairman and R. A. Boroffice (Nigeria) as Vice-Chairman and Rapporteur; for Committee II, Shunji Murai (Japan) as Chairman, Vladimir Kopal (Czech Republic) as Vice-Chairman and Luiz Gylvan Meira Filho (Brazil) as Vice-Chairman and Rapporteur; and for the Technical Forum, Peter Jankowitsch (Austria) as Chairman.

14. The Working Group also agreed that the Drafting Group, to be chaired by the Rapporteur-General of the Plenary and consisting of two representatives from each of the five regional groups, together with any additional representatives of the Member States invited by the Rapporteur-General to assist in the preparation of the full draft report of UNISPACE III, would include the following individuals: Dawlat Hassen (Egypt) and Mongezi Tshongweni (South Africa), for Africa; Sridhara Murthy (India) and a representative (to be identified) from Malaysia, for Asia and the Pacific; Dumitru Dorin Prunariu (Romania) and Arif Mehdiyev (Azerbaijan), for Eastern Europe; two representatives (to be identified) from countries in Latin America and the Caribbean; and Gabriella Venturini (Italy) and Lynn F. H. Cline (United States of America), for Western Europe and other States.

2. Allocation of agenda items and schedule of work of the Plenary, Committee I and Committee II

15. The Working Group considered a proposal made by the executive secretariat on the allocation of agenda items among the main bodies of UNISPACE III, based on the restructured draft provisional agenda (A/CONF.184/PC/L.4, paras. 23-27). The Working Group agreed on the allocation of the items as follows, on the understanding that the sub-item entitled "Ways and means to promote international cooperation" would be added to item 11, entitled "Economic and societal benefits":

Plenary:	items 1-6, 13-15
Committee I:	items 7, 9, 10 and 12
Committee II:	items 8 and 11

16. The Working Group also agreed on the indicative schedule of work of the Plenary, Committee I and Committee II as proposed by the executive secretariat (A/CONF.184/PC/L.4, paras. 28-29 and annex VII).

3. Arrangements for the activities of the Technical Forum

17. The Working Group agreed on the arrangements made by the executive secretariat for the activities of the Technical Forum, concerning, among others, their schedule and conference services to be provided (A/CONF.184/PC/L.4, paras. 32-37 and 42-50, and A/CONF.184/PC/CRP.12 and Add.1).

4. Additional international organizations to be invited

18. The Working Group recalled that the Preparatory Committee at its 1998 session approved the list of international organizations to be invited to UNISPACE III on the understanding that, if agreement was reached, other international organizations could be added to the list at the 1999 session of the Advisory Committee. The Working Group noted that the Pugwash Conferences on Science and World Affairs and the European Space Science Committee of the European Science Foundation had expressed their interest in participating in UNISPACE III and agreed that those organizations should be invited.

5. Participation of national organizations and the statements to be made by space-related international organizations without observer status with the General Assembly or the Committee on the Peaceful Uses of Outer Space

19. The Working Group noted that the provisional rules of procedure did not explicitly cover the questions of the participation of national non-governmental organizations and the statements to be made in the Plenary, Committee I or Committee II by space-related international organizations not having permanent observer status with the General Assembly or the Committee on the Peaceful Uses of Outer Space. Considering that both national organizations and space-related industries would be invited through their Governments, the Working Group recommended that the relevant provisions of rule 16 of the provisional rules of procedure, governing the participation of space-related industries, should be applied to the participation of national organizations. The Working Group also recommended that, under rule 15 provisional rules of procedure, it should be unde that international organizations that were identifi called upon, under item 7 of the provisional age present reports should be permitted to make stateme their reports.

6. Voluntary contributions

20. The Working Group noted that, in his stateme Director of the Office for Outer Space Affairs Secretariat had invited Member States, space agenci relevant national and international organizatio consider supporting the preparations for UNISPA through voluntary contributions. The Working noted with appreciation that the Government of A the province of Styria and the city of Graz had pr substantial financial assistance by renting space Austria Center Vienna, seconding a junior profes staff member, co-sponsoring the activities of the Tec Forum and the Space Generation Forum and orga social activities for participants of UNISPACE II Working Group also noted with appreciatio contributions of the Centre national d'études spaci France, in providing financial support for the publi of the preliminary programme, of the Governm Japan, in seconding an expert, and of the European Agency, in co-sponsoring the regional prepa conferences for UNISPACE III and providing fi support for the reproduction of the UNISPACE III The Working Group noted with satisfaction that Member States were also considering making vol contributions to ensure the success of the preparati and the convening of UNISPACE III. The Working invited others to do the same.

21. The Working Group noted that the question participation of the least developed countries ha raised in the Fourth Committee of the General Ass at its fifty-third session. The Working Group note satisfaction that, in response to a request by the W Group on the agenda item on international coopera the peaceful uses of outer space, the executive sec was seeking voluntary contributions to suppo participation of the least developed countries Working Group invited interested Member Stat international organizations to consider making vol contributions to assist the executive secretariat endeavour.

7. Future work

22. The Working Group recommended that the executive secretariat should be requested to prepare a report, for submission to the General Assembly at its fifty-fourth session, on the organizational matters relating to UNISPACE III, which should provide guidelines for other bodies in the United Nations and organizations within the United Nations system for organizing a conference that would address global issues while keeping its cost within existing resources.

Notes

[a] *Official Records of the General Assembly, Fifty-third Session, Supplement No. 20* (A/53/20), paras. 23-44.

[b] Ibid., para. 35.

[c] Ibid., para. 40.

[d] Ibid., annex.